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SESSIONAL PAPERS

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Royal Institute of British Architects.

1875-76.

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LONDON:

PUBLISHED AT THE ROOMS OF THE INSTITUTE, 9, CONDUIT STREET, HANOVER SQUARE, W.

1876.

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DRYDEN PRESS: J. DAVY & SONS, 137, LONG ACRE.

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Royal Institute of British Architects.

SESSION 1875-6.

At the Opening Meeting of the Session, held on Monday, the 1st of November, 1875,
SIR G. GILBERT SCOTT, R.A., President, in the Chair.

PRESENTATION OF MR. T. H. WYATT'S PORTRAIT.

THE preliminary business of the evening having been concluded—

SIR DIGBY WYATT, Fellow (who on rising was very warmly greeted by the Meeting) said it afforded him the greatest gratification to be welcomed as he had been by his old friends and brethren of the profession, although he feared he could never again take the somewhat active part he had done in their proceedings, very greatly to his delight and very often, he believed, to his own instruction; but what little power he might have still, to use for the benefit of the Institute, he hoped to have the opportunity of devoting to that object. The little present which he was about to offer would, he hoped, be acceptable to the Institute. It was a Portrait of his brother, Thomas H. Wyatt, ex-President. The Council were kind enough, when he proposed the subject to them, to accede to his wish, that he might be allowed, at some time or other, to place this picture on the walls of the Meeting Room. At length, after certain delays, which were almost inseparable from the production of any work of art of this kind, by Mr. George Richmond's kindness and sedulous attention, he had succeeded in obtaining the portrait, which, at least was satisfactory, he believed, to the members of his family, and to himself certainly; and he thought, both as a picture and as a likeness, the general verdict would be that it was a very satisfactory work of art. He had now to ask the Institute to accept it, and in doing so to remember that, agreeable as this sort of souvenir was while men were living, yet there must inevitably come a time when it would be still more valuable and important, and when, in the lapse of time, it would be preserved as a memorial of those who have passed away. He believed the picture of his brother would always be valued in this Institute, and never perhaps, in a higher degree, than when they were losing recollection of the original.

Mr. A. J. B. BERESFORD-HOPE, M.P., Past President, begged that he might be allowed, as a predecessor—and a most unworthy one—of his very dear friend in the chair of this Institute, and as one who had a deep affection for the donor of the portrait and for architecture, to move that this gift be accepted with acclamation. He was sure all who had known and admired their friend would feel pleasure at seeing on the walls the features of one who was honoured as much as he was beloved, and as beloved as much as he was honoured; and in future time it would be a memorial of one who had worthily handed down a great name in the annals of the arts in this land. He (Mr. Beresford-Hope) was glad the presentation had taken place on this occasion, inasmuch as it had gathered round the president all, who were now alive, who had preceded him in that chair—one of whom was the subject of this picture. He was glad of this event; he was proud and happy to be present, and he was sure his friends around him would receive this gift with the heartiest acclamation.

Professor DONALDSON remarked that there was more connected with their art and the memory of their friend than mere panegyric. They must recollect that he had been called to execute great works, amongst which might be mentioned the basilica erected to the memory of the late Lord Herbert

of Lea, one of the finest monuments of modern art in the Italian style that was to be found, showing the great beauty of that class of building, and how well it could be executed in this country. He had also erected the important municipal buildings of Liverpool, which he had carried out with a magnificence of design and affluence of materials worthy of the purposes to which they were appropriated. These, together with his many other works, gave Mr. Wyatt his place in the history of English architecture. They not only possessed the portrait of the man as he is—it was a striking likeness; it showed the character which belonged to him, and the agreeable features which they loved to look upon—but it also showed that the past-presidents of the Institute of British Architects were worthy of the exalted position which Mr. Wyatt occupied.

The PRESIDENT said, he had great pleasure in conveying to Sir Digby Wyatt the thanks which had already been voted to him by acclamation. He would only add that he was delighted with the portrait; he admired it exceedingly; he thought it a beautiful work of art, and altogether a charming picture: but he saw in the room that which he admired more—the face of Mr. Wyatt himself, and he hoped they would long, long see it amongst them. They saw also the founder of their Institute here (Prof. Donaldson) quite unchanged, he was happy to say, and he hoped Mr. Wyatt would follow so good an example.

Sir DIGBY WYATT said, he had been requested to communicate an event which he had heard of with great grief, viz.:—the decease of their honorary member, Sir John Gardner Wilkinson.

After a few further remarks Sir GILBERT SCOTT proceeded to deliver the

PRESIDENT'S ADDRESS.

GENTLEMEN,—So far as it appears to me, the present moment is *not* one offering many interesting subjects for an Opening Address. I think you must be getting tired of the mere routine portions of those addresses, which tell you of facts you know just as well before, and re-traverse reports which have been long since printed and circulated, and discussed till they are thrown aside like a squeezed orange, having nothing more left in them either for praise or censure. I might give you—but perhaps they need scarcely be read—the statistics of our numbers, our receipts and disbursements; of our competitive prizes and medals though you have already had them before you. I may remind you with what satisfaction we presented our Royal Gold Medal to our highly respected and honoured Fellow, Mr. Edmund Sharpe; but you can in no degree have forgotten the enthusiasm which you so justly evinced on that occasion. And the same seems to follow up nearly every subject which offers itself as claiming notice on this occasion of our re-opening for a new Session.

These difficulties arise from our knowing all the matters beforehand which can be mentioned. Another great cause which stops my mouth is of a contrary nature.

I reminded you a year back—though you well knew it before—that during the previous Session a special committee had been appointed “to Consider and Report to a Special General Meeting as to the financial condition of the Institute, and the best mode of increasing its efficiency.” This statement I view as containing in itself the most important fact connected with our Institute, and I have reason to believe that no committee could have acted more sedulously, or with greater determination to do their duty *thoroughly*. They have, as I believe, held twenty-one meetings—often very long and laborious ones—and have placed themselves in communication with other cognate societies. They have presented their report *pro formâ* to the Council this evening. It has not yet been opened, but I trust it will soon be laid before the Institute. I have great confidence in the wisdom which will be found to have guided that report. Were I aware of its purport, it would not be my place to

anticipate the announcement of its recommendation. Being, however, without any certain information on the subject, not only am I unable to do so, but the very fact of the consideration of a report of so vital a nature being imminent, might tend to render anything I might have to say as to the future of the Institute either impertinent and abortive. At the same time I may, perhaps, be excused in confessing to a strong conviction that our Institute does not assume that position which is its due; that we do not, in the degree we ought, promote the cultivation of our great art, and that we are in danger of aiming rather to represent our profession as it is than our art as it *might* be and *would* be if we all devoted to it our whole heart and soul.

In my last address, I mentioned as desiderata: 1. The increase of our library; 2. The procuring of measured drawings of ancient monuments which are fast disappearing from the face of the earth, with fac-simile drawings of ancient decorations, &c.; and 3. Increased arrangements for sending out students to study their art, or to promote their studies under our own eye.

I trust that these objects will not have been overlooked by our Special Committee. I hope, too, that they will have suggested means by which our proceedings will become less the result of routine, and more the exhibition and out-come of the inner life of the members of our profession and the professors of our art. I hope, too, they will have thought of means of inducing the leading members of our profession to take more personal interest in our proceedings, and to become once more conspicuous rather by their *presence* than their *absence*. We do not want those proceedings to go on as by clockwork, but as the result of real zeal and vitality. I wish our leading men were emulous of office, and of seats on our council. I know by my own experience how our professional engagements interfere with all this; but I also know how our meetings have come from our lassitude and half heartedness to be voted a bore, and how the younger members of the profession fight off from joining us from a feeling that we have allowed our Institute to become too much a perfectly constructed automaton, and too little a thing of earnest and zealous vitality. It may be worth considering, too, whether the self-elective character of our council might not be moderated, and a certain number of seats be reserved, to be filled by the general assembly. And I am not sure that I should not like to see one outsider associated year by year, in some shape or another, with our excellent and most hard-working Secretary, as a means of importing, ever and anon, new life from the profession outside, just as our Government departments have moveable parliamentary secretaries as well as those of a permanent character; the latter keeping up traditions and routine, and I dare say the real work of the department, while the other represent the changing aspects of politics and public feeling. Lastly, in addition to placing ourselves *en rapport* with other societies of *Architects*, I greatly wish that we could do so also with those numerous non-professional societies, which devote themselves to the investigation of matters of art and archæology, and have thereby done such an infinity of good in very many directions, and not the least to ourselves as architects. Some of these societies are of long standing, others have been the growth of that period of activity which characterizes our own immediate period; and it seems strange that, while such societies have risen into active existence under our very eye, and are especially characteristic of our age; and, while many of our members take an influential part in their proceedings, our Institute has never (to my knowledge), in its corporate capacity, shewn any very marked recognition of their existence.*

Returning, however, to our annual statistics, our pecuniary returns for the year are fairly cheering, and show a greater balance in our favour than was anticipated. Our numbers show a reasonable increase, though we have to deplore the loss by death of a larger number of our members than

* N.B.—The official representatives of the learned Societies are, it is true, annually invited to attend the Meetings of the Institute.

in some previous years. Their names are as follows:—Messieurs Auguste Joseph Pellechet, M. H. Labrousse, M. E. J. Gilbert of Paris, M. Esperandieu of Marseilles, Il Cavaliere Cipolla of Rome, Honorary and Corresponding Members; Professor Willis and Sir Gardner Wilkinson, Honorary Members; Mr. G. E. Laing, Mr. R. Bell, Mr. George Gutch, Mr. E. Roberts and Mr. R. Tress, Fellows; Mr. H. E. Kendall, Honorary Member and ex-Fellow; Mr. J. B. Waring, ex-Fellow; Mr. F. Atkinson and Mr. A. H. Thompson, of Leeds, Associates; and Mr. R. W. Billings, ex-Associate. As I am not able myself to say what ought to be said of all these our late members, I will content myself by singling out a few, leaving it to our Foreign Secretary and others to supply my deficiencies. I will first make mention of Professor Willis.

Though his special subject was Mechanical Science, of which he was Jacksonian Professor at Cambridge, and on which he was a lecturer at the Royal School of Mines and Museum of Economic Geology, he at an early period turned his special attention to the subject of Architectural Archæology. In 1835 he published his “Remarks on the Architecture of the Middle Ages especially in Italy,” a work of great research and acute observation. Shortly after the foundation of the society which has since branched out into the Archæological Institute and the Archæological Association, he in 1843, published his “Architectural History of Canterbury Cathedral,” probably the most admirable work of that class which has ever been produced; in which he has, with wonderful skill and clearness, brought out the history of every portion of the building, by joint reference to documents and to the actual structure, in a manner never before attempted, and which will probably never be surpassed. I may here mention that twenty-five years later he carried on that famous history by publishing his “Architectural History of the Conventual Buildings of the Monastery of Christ Church in Canterbury,” a worthy conclusion to his previous admirable work. During the intervals between these two publications, he had almost annually lectured before the Archæological Institute on the history and antiquities of some great building; and those only whose high privilege it has been to be present at such lectures know thoroughly how extraordinary were their merits, as clear and accurate expositions of the subjects, nor how remarkable were his own personal merits as a lecturer.

Unhappily, though he was unwearying in his researches and ample in his written notes, he rarely wrote out these lectures for publication, always hoping for a more convenient season, and the reports of them have been for the most part deplorably scanty. Among those published, may be named his papers on the Cathedrals of York and Winchester in the volumes of the Transactions of the Archæological Institute on those cities; one on Chichester, published in a volume dedicated especially to Sussex; one on Glastonbury, separately published; two smaller papers on Worcester and Lichfield; and one posthumous paper, compiled or edited from his notes by his friend and disciple, Mr. Stewart, on Norwich Cathedral—all in the Archæological Journal. Besides these works, I will mention his paper on the Holy Sepulchre in Williams’ “Holy City,” and an excellent essay on the Architectural Nomenclature of the Middle Ages, published in 1844; a Report on Hereford Cathedral, written in 1841; a paper on the Great Seals of England, in 1845; and an admirable paper on the Vaults of the Middle Ages in our own Transactions of 1842. His unwritten lectures on Cathedrals, &c., were most numerous, and it is to be hoped that his friend Mr. Stewart will be able to resuscitate them, as he has done that on Norwich, and as I believe there are hopes of as regards his history of the Buildings of the University of Cambridge.

He united in himself, in a surprising degree, every quality requisite to the investigation of Architectural history; a thorough knowledge of Architecture itself, and of construction, a facility of reading and interpreting ancient documents, an unequalled power of weighing evidence, and of laying an absolute restraint upon himself from going ahead of his evidence, or of following out any passing fancy of his own, and at the same time, a most marvellous power of seeing through the whole of the

evidence before him, and of hitting upon the right theory when all facts and evidence had been fully investigated and weighed. I have often said, and I repeat it, that such a mind had never before been brought to bear upon such subjects, and that I did not believe it ever would be again.

The other two of our lost members, or ex-members, whom I will especially mention are Mr. Billings and Mr. Waring, so well known as able illustrators of Ancient Art. The former has done well what Britton had omitted to do with reference to the Cathedrals of Carlisle and Durham, and had followed out the latter by illustrating other Architectural Antiquities in the same county. His name will, however, be more intimately connected with the Mediæval Antiquities of Scotland—which his great work illustrates as graphically, perhaps as is possible without measured drawings and details. Would that some competent man would take up this most rich but neglected field of illustration, and give us Scotland's glorious Mediæval Architecture, laid down by rule and line, before it has for ever perished from the face of the earth! I had hoped that this would be undertaken by our talented Fellow, Mr. Anderson of Edinburgh, than whom no man living is more competent, and who already possesses extensive materials for such a work; but I fear his increasing practice will interfere.

Mr. Waring's field of illustration, as you all know, was coloured decoration, in which he has done enough to increase, were it possible, our sorrow for his all too early decease. Would that he may have worthy successors in the same rich field! I wish that some one of our members, as for instance Professor Lewis who so well knew him, would supply for our Transactions some account of his career and his labours.

Mr. E. Roberts, F.S.A. of whose loss I have only heard while writing the above, was well known for his antiquarian tastes, especially, as I believe, in connection with the British Archæological Association and other kindred Societies.

The List of Medals and Prizes annually offered by the Institute has been supplemented this year by two notable additions. One is a prize of £40. derived from a fund bequeathed by Sir William Tite, for the purpose of encouraging the study of Italian Architecture. The *manner* in which that fund is to be applied was left under the testator's will to the discretion of our Council for the time being, and a careful scheme for the application of the income was some time ago drawn up and issued to our members. This year the income in hand will be devoted to a prize for an Architectural design, the subject of which has been already announced. Another year it may be offered for the best studies of Italian Architecture; or the fund may be available for providing lectures, or purchasing illustrated works, on the same subject, for the use of students in our Library. It was probably Sir William Tite's wish to encourage by this bequest the study of Italian Architecture, as the study of our English Gothic is promoted by the Pugin Fund. Both objects are excellent, and so far as this Institute is concerned, they may now be said to have been placed on an equal footing.

Mr. Grissell's bequest was made with a different purpose. Having for many years, and honourably, pursued the occupation of a builder, he was, no doubt, fully aware how important an element in every architect's education a practical knowledge of construction must be. It seems that at one time of his life he was in the habit of attending meetings at this Institute, and perhaps he had noticed that among the many prizes which it annually offers for the encouragement of students, there were none which could be definitely awarded for a good set of working drawings. To supply this deficiency he has founded a Prize, which, under the terms of his will, must take the form of a Medal. It is offered for the first time this year, and, like the Tite Prize, will no doubt attract many competitors.

The award of the Prizes last Session must be still so fresh in your memory, that it will be unnecessary for me to remind you how many sets of drawings were submitted, and how excellent several of them were. The walls of this Room and the Library were almost lined with strainers, among which I

would especially mention Mr. Neale's admirable monograph of St. Alban's Abbey, and if the competitors for the Tite and Grissell Prizes this year should be proportionably numerous, it is evident that one of the lower galleries must be temporarily engaged for the exhibition of Prize Drawings next year. Indeed this room, though tolerably convenient (when properly ventilated) for our evening meetings, has always been found, from the small size of its windows and the insufficiency of its wall space, singularly ill adapted for the exhibition, and therefore for the proper examination of architectural drawings in the day time, while our Library can only be made available for that purpose by screening over—perhaps for several days—our bookcases, to the great inconvenience of readers and the Librarian. The Special Committee for the object of promoting the efficiency of the Institute will, no doubt, be prepared with many suggestions respecting its domestic economy, and I sincerely trust that, among others, will be one for providing better accommodation for the Prize Drawings. I take this opportunity of stating that the question of ventilating this room is in the hands of an efficient Committee, who have already done something, and propose to do more, towards securing the object they have in view.

As my term of office is drawing to a close, I would crave your indulgence while offering a few remarks on one or two subjects in which I feel a special interest, and which I have already more than once touched upon in the course of my address.

The first relates to those productions of Architectural art which at once illustrate the history and civilization of our country, and many of which are themselves the witnesses and embodiment of the noble styles of architecture which have in former times flourished on our soil.

These remains embrace, besides the relics of mythic or uncertain periods—

1. Roman and Romano-British remains, for the most part below the surface of the ground, but nevertheless containing beautiful works of art, and occasionally (as in city walls, &c.) rising into a more natural field of view.

2. We have, scattered throughout the length and breadth of our land, remnants, more or less fragmentary, of the works of our Anglo-Saxon forefathers, from the days of St. Augustine to those of St. Edward the Confessor—a period as long as that which intervenes between Edward III. and Queen Victoria, or between the Confessor and Charles I.

3. We have the stupendous Cathedrals and Monastic Churches, with their accompanying buildings, erected throughout the country immediately subsequent to the Norman Conquest, with innumerable churches on a smaller scale, besides castles and other buildings; and, from these proto-Norman structures onwards, we may trace in actual monuments, though too often in ruins, the history of the style which had been then imported into this country, from its first fight with that which it supplanted, to its own disappearance before a nobler successor of its own creation, at the close of the twelfth century.

4. We have the amazing productions of the thirteenth century, and the glorious catena of Mediæval styles which followed it, by which the whole land was replenished with structures of all kinds, not excelled in beauty by those of any period of the world's history.

These styles,—though in a wide sense belonging to all the nations of Western Europe,—in the varieties they assumed in our own country are strictly *English*, and form a special and most delightful illustration of *English* history. How precious, then, are they to us as Englishmen! and how jealously would the outer world expect that we should cherish and protect them! Alas! alas! Oh tell not the truth in Gath lest the daughters of the Philistines triumph!

We have, next, the productions of that peculiar form of Renaissance which arose in England, and is known as Elizabethan and Jacobean, lasting on, more or less, till the great Rebellion and later; after which come the illustrations of the struggle between this and the imported Palladian,—and, later on again, those phases of Anglo-Palladian popularly known by the name of “Queen Anne,” though it would

seem that that excellent sovereign had not only, unconsciously to herself, thrown back her capacious mantle over all that belonged to the Houses of Stuart and Orange, but dropped it by anticipation on the shoulders of her successors of the House of Brunswick. Anyhow, nearly every period up to that of the great Napoleonic war has left us innumerable works, from the cathedral and the castle, and the college, down to the parish church, the squire's and citizen's houses, the farm and the cottage; every one of them, as it were, pages in English history, which we can ill afford to lose, and any attempt to tamper ignorantly with whose text we are bound as true Englishmen to resent and resist.

Now, seeing that we, as Englishmen, are encompassed with and are possessors of so rich an endowment of the visible symbols of our history,—it is clearly our duty, not only for our own sakes but in the interests of future generations, to preserve the precious consignment from injury, and to transmit it in as perfect a condition as possible to our successors; and it is, further, our duty, where lapse of time and natural causes threaten the gradual effacement or destruction of these invaluable landmarks of architectural art-history, to preserve such perfect drawings of their details that, though the *reality* may perish, the *design* may be handed down in as clear and intelligible a manner as if the work had been able to resist the ravages of time.

It appears to me that measures calculated to insure these two great objects—viz. I. the *preservation*, and II. the perfect *representation* of these crumbling monuments of our art, *should emanate from a Society like our own*, which aims at representing the art and profession of architecture in Great Britain, and which has been Incorporated for that object by Royal Charter; but that we should endeavour, at the same time, to associate with ourselves those other Societies whose objects are the promotion of the study of architecture or archæology—for the favourite aphorism that “archæology is not architecture” ceases to be a truism when applied to ancient monuments.

In urging the conservation of old works, there is a marked distinction between those *in ruins* or wholly disused, and those which continue to be made use of. In the former class, simple conservation is all which can usually be aimed at, but there is the collateral advantage of freedom from all utilitarian influence or requirement. In the latter class, while we have, in the case of churches, the satisfaction of feeling that we are rendering them more fitted for their sacred uses, and more conducive to the glory of God, there are always practical requirements demanding due consideration, and one's great aim is to meet the claims of the present at the smallest possible sacrifice (if any) of those of the past.

In dealing with *houses* or other secular buildings still in use, the difficulty is greatly enhanced, inasmuch as their modern uses usually differ more widely from the old ones than is the case with churches. Returning for a moment to *ruined* buildings, I hold that we have two great duties incumbent upon us: the first is to use our influence with their proprietors to protect their mouldering remains from those influences which hasten decay; as, for instance, defending the tops of walls from the soakage of rain, strengthening parts already loosened, undermined or otherwise threatened, and adopting any other measures tending to arrest the progress of destruction and decay. Our second duty is to promote and encourage the faithful and exact delineation of the architecture of these remains, even to the minutest details. We spare, and our predecessors have spared, no pains in so delineating the remains of Greek or Roman architecture, and we, as they, are entirely in the right in doing so; why, then, should we allow the equally precious and equally beautiful relics of the architecture of our own forefathers,—to ourselves of vastly greater interest as being *our own*,—to fall year by year into more and more hopeless ruin, and their exquisite details to become disintegrated, grain by grain, under our very eye, without stirring ourselves to preserve accurate and detailed drawings of the works of art destined thus rapidly to perish?

We, as an Institute, do a great deal by means of the competitions for our Pugin studentship (which usually take the form of measured drawings of some of these perishing art treasures), but we

should aim at and strive after some more systematic method of dealing with this most urgently pressing object. I know many remains whose details, every time I visit them, seem to get *dimmer* and *dimmer*, from the yearly falling away of their surfaces in impalpable dust, and which another generation will find utterly unintelligible. Such is the case with the remains which surround the cloister court of Fountains Abbey; such, too, is the case with that invaluable remnant the sanctuary of Tynemouth Priory, with its accompanying fragments, perhaps unequalled in their architecture by any cotemporary building in England; such is the case in a still more distressing degree with Kelso Abbey, and such is the destined fate, sooner or later, of most of the ruined structures which remain throughout our land as proofs at once of the glorious art of our forefathers and our own heedlessness. We need not suppose that the admission that this duty is incumbent on ourselves involves the consequence that the *cost* must necessarily fall upon us. There can be no doubt, that if we take the initiative, funds will be supplied by the very many who take an intelligent and zealous interest in the subject; but, if we hold our peace, who ought to be the first to speak, how can we expect others to bestir themselves?

When we come to buildings still in use, and especially to churches, we have a truly mournful and disgraceful scene presented to us!

Our churches had, during the three centuries between the extinction and the revival of Gothic architecture, for the most part been allowed to fall, step by step, into a state of sordid and contemptuous neglect, decay and dilapidation; while they become encumbered with galleries, pews and all manner of incongruous interpolations. Nothing being, in many cases, considered too mean in character for an old Gothic church. People became conscious of this before our architects became fitted to correct it; and, like Jack in Swift's "Tale of a Tub," set about ridding their churches of disfigurements before they knew what to substitute for them, and—with every blemish removed—tore off some fragment of the original fabric, and mended the tear with work of their own, if not quite as incongruous, certainly far more nauseating. Soon, however, they got to think they knew all about the matter; and boldly set about restorations, as if the old art had been beyond question revived. They even disputed among themselves as to whether restorations should be "*conservative, destructive or eclectic*;" great authorities not being wanting to defend even the destructive system! Meanwhile,—even with those best disposed,—knowledge was imperfect, and the difficulties of careful and well-considered treatment immense. The promoters of the work were more impressed, perhaps, with the axiom of the first church restorers—that the House of God ought not to be less carefully dealt with than our own houses, than that with the equally indisputable fact that they had a treasure of ancient art and of ancient church history to deal with, which demanded the most earnest study for its conservation. Walls and roofs were found decayed, and their entire *renewal* was urged; changes in our ritual, it was argued, demanded corresponding changes in arrangement; clerks of the works, builders and workmen vied with each other in opposing conservative measures; and—fight as they would—all kinds of influences continued, in addition to their own short-comings, to check or frustrate the efforts of conservative architects, so that the result was, at the best, a mixture of successes with failures—of right decision with compromise.

This has now been going on for years, so far as concerns the best among us, but many well meaning restorers, from imperfect knowledge and want of firmness, come yet worse out of their work. Beyond these, however, is a very different set of restorers *so called*, a host of men not always architects even in name, though occasionally, men justly respected in other branches, and who ought to know better than to touch this; but, for the most part, men who have taken to Gothic architecture, as being a style in vogue, and merely as a part of their stock in trade; and into *their* hands a very large proportion of our churches fall. They may be likened to a herd, before whom our precious pearls are cast, and who trample them under their feet, and turn again and rend all objectors.

We receive, from time to time, appeals to our Committee for the Conservation of Ancient Monuments against vandalisms which one would think incredible; and only within the last few days I have heard of one clergyman selling to a grocer one of the old chained-up books which he thought would disfigure his "restored" church; and of another expelling a famous series of brasses to secure the uniformity of his encaustic tile floor; while one hears of noblemen of the highest names who make over the nomination of architects for the restoration of the churches on their estates as a piece of patronage which is the perquisite of their agents.

Taking a review of the results of this sad history, one may say that a certain proportion of our churches have been carefully dealt with; another proportion treated with fair intention but less success; but that, as I fear, the majority are almost utterly despoiled, and nine-tenths, if not all, of their interest swept away; nor is a word of remonstrance raised against this by those whose position would enable them to prevent it; indeed I can with confidence assert that more objection is raised against those who labour hard to do their duty carefully, than against the whole host of those who have so ruined our old churches, as to render a church-tour one of the most distressing and sickening of adventures. Yet, happily, *a remnant remains*: a few churches in each district are still left unrestored; and for them, like the remnant of the Sibylline books, it is worth while to pay any price for their preservation. I saw one such church recently, on a little tour in the eastern counties, as if in the still water missed by the tide of destructive restoration; its roof still retaining the thatch which once prevailed through that district, but admitting the rain in torrents. Its timbers the veritable old ones, though partially decayed; its quaint and beautiful seating remaining almost entire, though preyed upon by the worm; its floor retaining beautiful tiles, of varied geometrical form and unique design, though loosened and displaced; its windows still containing extensive remnants of the most beautiful fourteenth-century glass, exquisite in design and colouring, but ready to drop out of its leading; the walls, happily, nearly as good as new, and with windows, arcades and niches of the most perfect design; the whole just wanting that *tender, loving* handling which would preserve all which time has spared, and give it a new lease of existence. Oh, that we could search out these *last gleanings* from the harvest of destruction, and save them from the destroyer's hands.

Time would fail me to speak of the numberless relics of domestic work of all periods, which still add interest to our cities, towns and villages, as well as the manor houses, homesteads and cottages of the intervening country. They are fast perishing under the hand of time and of modern improvement; nor do I know any influence but that of local societies which can be brought to bear upon them. Why are we not *en rapport* with such societies for a purpose crying so loudly for our mutual aid? It is, anyhow, most desirable that they should be perfectly *delineated*, and I commend it to those who have so actively taken up the domestic styles of the seventeenth and eighteenth centuries to see that this, at least, is done so far as concerns that latest branch of our national antiquities. If we are doomed to lose the *realities*, one by one, let there, at the least, be *accurate representations* of them kept and published. This, our age, has revived the love of such objects, but, strange to think, it has also acquired a perfect mania for their destruction. Let us, then, as an Institute boasting to represent our art, endeavour to bring our influence to bear for the preservation of these precious relics; and if any of them must inevitably perish, let us perpetuate their memory by our drawings.

The other matter I would wish to bring before you is of a totally different kind. We have heard this year a great deal about workmen-architects, and about the abolition of all other architects being the great hope of English architecture. I had not thought of this when about to call your attention to a strange reverse of this picture, but it occurred to me first when about to write this paragraph. I ventured, in my first address to you from this chair, to suggest that a vast deal of what is done by professed

architects is by no means to the credit of our age and our profession; what I wish now to call attention to is the greatly lower depth to which we sink where the aid of our profession is wholly dispensed with. We have *square mile after square mile* of suburban land constantly being "covered" by houses, from the lowest to the highest class, in the designing of which no architect has ever had a hand. These will go down to posterity as the works of the architects of this *age*, and are at this moment viewed by foreigners as the works of the architects of this *country*. Happily, these forests of would-be architecture are interspersed, here and there, by the solitary works of genuine architects, and in one instance relieved by a whole district having been designed by one of our own body, and the exception serves to prove the rule, as the contrast does to show how bad the rule is. I view this as a national disgrace; and, at the risk of appearing to be following a self-seeking policy, I earnestly commend it to the consideration of that Institution to which is entrusted the Guardianship of our English Architecture.

Mr. BERESFORD-HOPE said—Mr. President, I was looking to our honoured founder and leader to rise and perform a duty, which is at the same time a pleasure, but he has most kindly asked me to do it in his name as well as my own. I am sure we have all listened to your Address—I know I have—with great pleasure; and I will tell you why. You, Sir Gilbert, have the courage to speak out your own plain, entire mind—and let me tell you, in these days, that is no small merit in any man—whether in the Rooms of this Society or elsewhere. I am very glad at what you have said, and I trust it will go out to the world in your own forcible language. I am sure you have blown away a great many clouds of prejudice. We feel and deplore the mutilations which have been palmed on the world under the name of restorations; but I believe they are the work of the uneducated, or at best, half-educated; and although they have been sometimes imputed to those who have taken the lead in architecture, it is well to them that the cap does not fit their heads. No doubt we, the members of this Architectural Society, thirty years ago did a great many things which we are much ashamed of now. But of course we are all growing a little older, and it is to be presumed we have grown a great deal wiser—I trust so at least—and I believe, with the consent of all reasonable people, all thinking people, and all educated people, the very best form of restoration means conservative preservation. At the same time there are many things—such as whitewash, square pews, and so on—which are so exceedingly unsightly, and so absolutely destitute of any artistic value, that we all feel that they should be swept away. After all we fall back upon common sense—and what is art but common sense? Art is the exhibition of beauty in its various forms, and art, beauty and common sense are co-relative terms. I am rather sorry, Sir Gilbert, that you passed over so lightly that craze of the day, about workmen-architects. There would appear to be the idea, on the part of some people, that ignorance is marvelously gifted with the power of producing more beautiful things than professional education and instruction are capable of doing; and as for what you have said about the semi-detached houses, the rows of villas and the builders' cottages in the suburbs, it is just a proof of what the workman-architect will do when he is called to deal with this question; and it will take a good many articles in the *Quarterly Review* to prove to me that when a man has amassed capital together, he will be a heaven-born Phidias any more than when he has no capital at all.

Let me hark back for a moment to the earlier part of your address. I listened with peculiar interest and sympathy to the tribute which you paid to our dear and honoured and most remarkable friend, Professor Willis, as you said, Sir—a man, the like of whom never appeared before. That is a common phrase, but it is really one peculiarly applicable to the late Professor Willis. In the particular branch of archæology which he laid out for himself, he exhibited, in a most striking manner, the powers of mathematical analysis which existed in him to an extent which probably have never

existed in any other man, and I think we ought, in our position, to press on those who represent him, that it is a duty which devolves upon them to give the world the benefit of those researches which he did not live to publish himself. All who know Mr. Stewart must know what a labour of love that would be to him. We know his affection for Professor Willis was more like that of a son than of a friend, and there is no man in the world who would require less pressure than he to carry out that work. There are many other points in your Address on which I could touch, but I feel, at this late period of the evening, I had best confine myself to the duty laid upon me, of proposing that we convey the most hearty thanks of the Institute to our President for his most excellent address, at the same time trusting that on the revisions and additions which, with that modesty so characteristic of him, he may desire to make, he will lose as little time as possible in order that we may read it in print in our Transactions, in the form in which it will go forth to the public. I beg, with much respect, to submit this motion to this Meeting.

The Resolution having been passed by acclamation,

The PRESIDENT acknowledged the compliment paid to him, and thanked the Meeting for the kind way in which his remarks had been received.

RECENT EXCAVATIONS AT ROME.

THE PRESIDENT, in calling attention to a collection of drawings and photographs in connection with the excavations of the Colosseum at Rome, which had been kindly exhibited by Mr. John Henry Parker, invited that gentleman to favor the meeting with some remarks upon them.

Mr. J. H. PARKER, Hon. Member (complying with this request) said, I had no intention on my own part of exhibiting these drawings to-night, but calling at Sir Gilbert Scott's office a few days ago, and intending to remain in England a few days longer before taking my departure for Rome, I have great pleasure in complying with his request that I should bring this collection here, and offer remarks in explanation of them.

The Flavian Amphitheatre or Colosseum at Rome I need not say has been considered one of the wonders of the world. The proportions of that structure were 500 feet long, 300 feet wide, and 120 feet high. We have no distinct record of the time when this enormous structure was begun. Suetonius indeed mentions it among the works of Vespasian, and it is represented on one of his coins, A.D. 80, with the head of Titus on the obverse, Titus and Vespasian being then joint Emperors. This was the year of the dedication, and it is the earliest representation of this building that we have. Suetonius does not say that it was begun in the time of Vespasian, but only that it was one of the great works of his reign. The assumption that it was all built in ten years therefore falls to the ground, and this is obviously very improbable. We are distinctly told that the plan originated with Augustus, and although it was not built in his time, it was probably begun in the time of Nero, on the site of what Pliny calls the "insane work of Scaurus," part of which he says was temporary only, but another part calculated to be eternal. That is the substructures of tufa, but that was in the Campus Martius, and not on this site. Julius Caesar had previously built an Amphitheatre of wood, and had exhibited naval fights with large vessels, the hunting of wild beasts, and the gladiators.

We are told that Nero made a Gymnasium and Naumachia in connection with his great palace, or golden house, and no vestiges of any such buildings have been found, unless both were combined in the great building called the Colosseum from its colossal size. It is evident that Nero made two great reservoirs of water on this spot, which were supplied from his aqueduct, the Caelian. The *specus*, or channel for this water remains called Stagna, in the wall of the Claudium on the northern side opposite the Palatine;

and at the north-east corner of that part of the Caelian hill on which the Claudium stood, are remains of a Piscina of the time of Nero, obviously intended for the filtering place before the water went across into the Colosseum. At a short interval only, about a hundred yards to the south of this, is another Piscina of the time of Alexander Severus, when the upper story was added, and the whole building repaired after the great fire. To include the Gymnasium in the same building, he made a wooden floor over the reservoir, which he could remove and replace at pleasure; this was covered with sand for the athletes to wrestle upon, and became THE ARENA. Around this great basin galleries were erected for the spectators, which were gradually enlarged and raised higher as the seats were further off; and the great stone arcades of the Flavian Emperors, with the corridors in them, are built round those older galleries, which were chiefly faced with brick. Several of the brick arches of the galleries, in the fine brickwork of Nero, remain in the Colosseum; and the stone arcades were evidently built up against them without any junction between the two in any part. The bricks in the side of the arch next the stone piers of the corridors are, in many places, cut in half to make way for the stone piers. The straight vertical joints between the brick galleries and the stone arcades are often two or three inches wide. This may be the effect of an earthquake, but there is no bonding between one and the other. The enormous arcades and corridors are in themselves a gigantic work; and it was evidently difficult to obtain so great a supply of materials. Piers of travertine are used about ten feet apart, and the intervals between them are filled up with large blocks of tufa, evidently taken from a previous building, probably from that part of the second wall of Rome which was under the south end of the Palatine, close at hand for the use of the builders, and not then wanted for any other purpose. In other parts the intervals between the piers of travertine are filled up with brick walls.

Suetonius compares the Stagnum of Nero to a "sea" surrounded by the buildings of a city, a strong expression, which shows that there was some building immediately round it. The representation of this great building on the coin of Titus was evidently taken from the design of the architect. It represents a building of two storeys only, with gigantic statues underneath each of the arches of the corridors.

The external wall and corridor are of three periods. The first is the ground floor only with the Doric order of columns; the second is the first and second floor with the Corinthian columns, which is a little later than the lowest part, but not with any long interval. The upper floor is an addition of the third century. This replaces a wooden storey, which caught fire by lightning in the time of Macrinus (A. D. 217). It was restored in stone, chiefly in the time of Alexander Severus, and completed in the time of Gordian III. (A. D. 240), for which reason it is represented on one of his coins with the inscription *MUNIFICENTIA GORDIANI AVG.* (1).

Before this time Marcus Antoninus Pius is said to have restored this great building. Probably he made some repairs after it had been damaged by an earthquake, as happened again some time afterwards. In the interior of the building, as we are told in the Chronicle (2), Vespasian dedicated the three lower steps, and Titus added two others to the three placed by his father. The wooden gallery built upon the top of the great corridors or arcades (for the plebs) appears to have been an afterthought, not part of the original design but an addition obviously called for. The large space at that height gave accommodation for an enormous number of people, which could not have been given before, to see what was going on upon the Arena or Stage during the performance. This had numerous trap doors in it, under which were lifts for the wild beasts in their cages to be sent up on to the stage when wanted. The performance was in many respects like our pantomimes. There are evident traces of the lifts below, and vertical grooves in the stone walls for them to slide up and down; and recesses remain in these walls for the counter weights also to work in, with holes for the sockets

of pivots for the capstans necessary to wind up the cords, and loose them as required. These original walls, with the grooves for the old machines, are, in many parts interfered with by more modern walls built up between them, probably in the fifth and sixth centuries, when great repairs were made after earthquakes, or perhaps rendered necessary by the weight of the water under the wooden floor in the central part.

Calpurnius gives a description of the sea monsters exhibited in the Colosseum in such a manner that it is impossible to doubt that this is the building intended. At a later period Dio Cassius, a Roman Senator, at the time that the scene took place that he describes, relates that the Emperor Commodus, in the year 191, gave public games in the building, in which he assisted personally in this manner. First he went from his throne on the Arena, and wrestled with the athletes—when tired of this he ordered the wild beasts to be let in (still on the Arena), then ordered the boards to be removed, and the water to be admitted witnessing a naval fight. Again, tired of this, he ordered the water to be drawn off, the boards to be replaced, and had a grand supper on the Arena. Dio had previously described such scenes at the time of the dedication by Titus; and there can be little doubt that the old Naumachia mentioned by him was that of Nero on the same site.

Herodian, the Greek historian, writing about the middle of the third century, says that the hundred lions killed in the amphitheatre by Commodus leaped out from under the earth. More strictly speaking, they came from under the sand on the stage, as they were sent up in cages which opened at the top, and naturally sprang out as soon as liberty was given to them. These cages were of wood, and were called *pegmata*. The word *pegma* is used in different senses by Pliny, Martial and others for a wooden cage or framework; and the wild beasts were brought in such cages from the places where they were kept outside the walls, called *vivaria*. There were two of these receptacles, one near the south end of the Praetorian Camp, the other on the north east side of the Amphitheatrum Castrense, which was connected with the Sessorian Palace in a similar manner as the great amphitheatre was connected with the Palace of Nero; and both are of nearly the same period.

Pliny mentions that the podium was protected by nets. There were also projecting bars, which turned round when touched, so that the claws of an animal could have no hold upon them; these are mentioned by Calpurnius. Seneca, in his epistle (88), uses the word *pegma* for “a wooden machine used in the theatres,” which raised and lowered itself *imperceptibly*—evidently what we now call a lift, the machinery of which was not seen by the spectators. Wooden towers used on the stage in sham fights were also called *pegmata*.

The spectators were protected from the heat of the sun by a great awning, which was suspended from masts at the top by cords. There were probably similar masts at the bottom also to support the lower end of the cords over the heads of the spectators in the galleries. These masts are likely to have been fixed on the great beams of the screen in the front of the podium, they seem to have been concealed in the lower part by the great columns which have been found in large number with Corinthian capitals, rudely executed, lying on the ground. These columns would stand on the podium. The contrivances for supporting the masts at the top were very ingenious, and can still be seen. On the exterior there is a row of corbels, ten feet below the summit, for the masts to rest upon, and holes are left in the cornice for them to pass through. These masts stood full twenty feet above the walls; and on the inner side of the upper wall are also corbels for the cords to be fastened to keep the masts upright. The central space was not covered over, and the athletes were exposed to the weather. There is an excellent representation of an amphitheatre, with the awning partly closed and partly open, in a fresco painting of the first century at Pompej, which has been engraved in the excellent journal of Pompej, edited by the learned keeper of the Museum, Sig. Cav. Fiorelli. The construction of the upper walls

is quite different from them, and very inferior to that of the great arcades; this belonging to the end of the second century, not to the first; and part of it has all the appearance of having been completed in a great hurry, as we see in the interior many pieces of stone evidently prepared for other parts of the building, and used as blocks of material only, some with inscriptions on them, apparently taken from old tombs. The tradition is that the Emperor Gordian insisted on the completion of the building contract by the time appointed, which was done with great difficulty.

A large number of sailors were kept continually employed in furling and unfurling the great awning, and attending to the machinery. They had a camp provided for them on the Esquiline hill, near at hand, called *Castra Misenatium*, because the sailors came originally from the fleet at Misena. The exact site of this camp has not been ascertained. Some suppose it to have been on the Caelian, near where the *navicella*, or marble galley, now stands.

The awning was called *vela* or *vehela*, an old Latin word, from which came also the name of *velabrum*, meaning sails. The modern name veil is supposed to come from it.

Immediately in front of this principal passage is a remarkable piece of ancient wooden frame work, fixed in the ground, which has the appearance, at first sight, of having been burnt; but long exposure to wet will have the same effect on wood that fire has. The Irish bog oak often appears as if it had been burnt, and wood has been dug from under the foundations of an Irish round tower that had the same appearance. This frame-work is a good deal worn, as if it had been much used. When the naval fights were acted in the *stagnum navale* of Nero there must have been some machinery for lifting up the vessels and placing them on the canals. They must have been removed out of the way when the water was let off, and the boarded floor of the stage or arena replaced (1).

Dio Cassius mentions a narrow passage into the amphitheatre, by which the side passage, previously mentioned, seems to be intended. This would be the way from the palace on the Caelian to the Colosseum. Modern scholars frequently object to these words in Dio Cassius being applied to the Flavian Amphitheatre, because he uses the word *Theatre* only, but it is known that this building was called *THE THEATRE par eminence*,—as we say “the Opera” in London,—the great theatre that everybody knew. The surrounding this theatre with great corridors and arcades does not make it the less a theatre; and many of the passages cited can only apply to this building.

The numerous walls that intersect the space under the stage show clearly that there could be no area in this theatre, that there is no open space excepting on the stage itself, and this was the boarded floor called the *arena*, from the sand with which it was covered. The latter is quite a different thing from an *area*, and yet almost all the modern writers on the Antiquities of Rome fall into this mistake.

Mr. Parker having concluded his remarks, a vote of thanks was proposed and unanimously passed to him for his interesting communication, and the Meeting then adjourned.

Royal Institute of British Architects.

At the Ordinary General Meeting of the Institute, held on Monday, the 15th of November, 1875,
SIR GILBERT SCOTT, R.A., President, in the Chair.

ON THE DECORATION OF BASILICAS AND BYZANTINE CHURCHES.

By R. P. PULLAN, Fellow.

SO many admirable Papers on the subject of colour, as applied to buildings generally, have been read before the Institute, by Mr. Gambier Parry, Mr. Layard and others, and the best examples of polychromatic decoration have been so ably described: Sta. Sophia, by Sir Digby Wyatt; Monreale, by Professor Lewis; and St. Mark's, by Mr. Aitchison, that I might have hesitated before taking up the subject suggested to me for this evening's paper, had it not fallen to my lot to visit a few specimens of decorated churches in the East which have not been generally visited, and therefore not specially described. As, however, I shall have to notice some edifices, which have been particularly mentioned by these gentlemen, in order to give a complete description of the series of polychromatized churches, a certain amount of recapitulation will be unavoidable, but I shall curtail the notices of these churches as much as possible, and dwell at greater length on those examples which have not been hitherto described to you.

As there are but few churches in which the original system of polychrome remains intact, I thought it the best plan to illustrate the various styles of decoration by a series of drawings, shewing the general effect of each style—the result of observations made in various parts of Europe, which will, I trust, convey a clearer idea of what a polychromatized church was like at each successive period—than separate sketches of details. The larger drawings represent, 1. Three bays of a Basilican church in the first or trabeate style, of which there are but few examples out of Rome. 2. A bay of Byzantine church in the style which prevailed from the sixth to the tenth century. 3. A Lombard church, erected at Baveno, Lago Maggiore. 4. A bay of what may be termed a Giottesque church. 5. The Triumphal arch of an Italian Basilica of the fifteenth century.

As there is no single example of a Basilica remaining, in which all the decorative features exist, it is difficult to realize what the primitive church was in its pristine splendour. The two churches which best help us to imagine what old St. Peter's at Rome and old St. Paul's in London originally were like, are St. Paul's without the walls, at Rome, and St. Apollinare il Nuovo at Ravenna. It is true that in the restored San Paolo the decoration has been only in part revived, but what has been done, has been executed in good taste in mosaic and coloured marble, and therefore we are able to form a better idea of what the effect of a decorated Basilica was from this than from any other building in Rome. In the other Basilicas late frescoes have for the most part usurped the places of mosaic, and small *cinque cento* mouldings have concealed the severe simplicity of the early architecture. A short description of San Paolo, as it stood before the fire, may therefore be interesting to those who have not yet visited Rome.

The church was entered through a *quadriporticus* or *atrium*,—like those which we see at Saint Ambrogio at Milan, San Clemente, and the Cathedral of Salerno,—the walls of which were adorned with mosaic or fresco, as we may conclude from the analogy of Saint Ambrogio. The whole of what would be in England the western façade (in Rome the churches are not orientated) was covered with mosaics of saints on a gold ground, such as those we still see at Sta. Maria in Trastevere, Sta. Maria Maggiore, San Frediano at Lucca, and in the restored fronts of San Lorenzo and Sta. Pudentiana; in the two latter cases the restorers have unfortunately been content with painted imitations of the original mosaics.

I may here remark, that it would tend to illuminate the gloom of London if the exteriors of our churches and other public buildings were decorated with colour. Frescoes might be blackened by the smoke, but mosaics or painted tiles would only require occasional washing, and they might be protected from the frost by a vitreous coating, or even covered with plate glass. Our climate is not so severe as that of central Germany, yet there we find, at Munich and elsewhere, external polychromatic decoration extensively practised. Some years ago the exterior of the portico of St. Vincent de Paul, Paris, was partly adorned with paintings on lava; these were removed shortly after their execution, not on account of the unsatisfactory effect of the colouring, but because the character of the drawing was such that it offended the susceptibilities of the Parisians. Let us hope that the time may come when not only public buildings, but private houses, shops and warehouses, may be beautified by polychromatic ornament, and pictures referring to the history, destination, or the occupation of the inhabitants of each edifice. Think how much more interesting and cheerful Queen Victoria Street and Cheapside would be if adorned with acres of pictures, in the place of tons of tasteless stone and compo ornaments, in the non-descript styles which characterize most of the city warehouses. A walk through London, instead of being a melancholy peregrination between blocks of blackened brickwork, would become an enlivening and instructive promenade. Our houses would resemble a parterre of many coloured flowers; and should they be dimmed by the smoke, the occasional use of a mop would restore their original brilliancy.

To return to St. Paolo, the nave was entered through bronze gates cast at Constantinople. Similar gates exist at San Zeno, at Verona, Ravello, the baptistry at Florence, the cathedral of Pisa, and elsewhere. On entering, the spectator had before him a splendid vista, 400 ft. in length by 80 ft. in breadth, interrupted only by the baldachino, and terminating in an apse covered with rich mosaic. There were and are still, double aisles separated from the nave, and from one another by columns and arches, making the full width of nave and aisles 250 ft. The columns were of the richest marbles from Phrygia and Africa. Those of the restored church are monoliths from the quarries of Baveno, on the Lago Maggiore, so that one precious element in the internal colouring is lost. Above the arcades ran a series of portraits of the Popes in medallions; these are restored in mosaic by the workmen in the manufactory in the Vatican. Above them there were two series of pictures from Scripture history, divided by pilasters, not yet reproduced. These pictures are represented in the works of Ciampini and Gally Knight. The Triumphal arch, which separates the nave from the transept, is ornamented by a mosaic of Our Lord surrounded by the twenty-four elders of the Apocalypse, presented to the church by Galla Placidia, the daughter of Honorius, at the time of the completion of the Basilica by her father, A.D. 395; this mosaic and those of the apse, partly injured by the fire, have been accurately repaired. The vast transept was 290 ft. long by 90 ft. in width. The pavement of *opus Alexandrinum* has been replaced by one of polished marble.

Such was the Basilica erected over the tomb of St. Paul, and such were the old St. Peter's and the old St. Paul's, more noble in effect, more gorgeous in decoration, and altogether more church-like than the new St. Peter's and the new St. Paul's on Ludgate Hill.

A plan and section, kindly lent me by Professor Lewis, shew the dimensions of this magnificent

edifice, a rough pencil sketch of the interior of a Basilica in the first or trabeate style, and a coloured drawing of a decorated bays of a similar building may help to give those who have not seen a Roman Basilica some idea of the effect of a building of this class.

In St. Apollinare il Nuovo, the ancient cathedral of Ravenna, built by Theodoric, the mosaic remains, except in the chancel, which has been modernized. The columns of the nave are of the original marbles, the capitals semi-classical with immense abaci. Upon these rest semi-circular arches, above these arches there is a high frieze with twenty-four white robed holy men holding wreaths and advancing in procession towards the east on one side, on the other a corresponding number of holy women. At the east end of these figures there is, on one side, a representation of our Lord, on the other, the Virgin and Child attended by Angels. At the west end are represented the City of Classis and Justinian's Palace. Above, between the windows, there are single figures of Prophets, and over them small scriptural subjects, divided by groups of crowns and palm trees. The grounds throughout are gold, and the figures clad in light coloured robes.

In Sta. Maria Maggiore, at Rome, there is a series of mosaics with figures on a small scale, on the walls of the nave. With the exception of the Sicilian churches, the two churches just mentioned are the only ones in which mosaics remain in this position. That fresco was also employed on the nave walls we have evidence in the lower church of San Clemente, discovered beneath the upper church at a comparatively recent date. Here we find on the walls of the church and of the narthex, frescoes of dates varying from the fourth to the tenth century. The prevailing colours used in them are red, brown, and blue; copies of some of them are to be seen in South Kensington Museum.

The Byzantine church, with the curved surfaces of its domes, pendentives, apses and soffits, was more favourable for the exhibition of mosaics with gold grounds than was the Basilica with its flat wall spaces. Side by side with the church on the Basilican plan, which was employed by Constantine at Constantinople and Bethlehem, and which was retained till the time of Justinian, sprang up numerous circular and polygonal edifices, in imitation of the Holy Sepulchre at Jerusalem, till finally the cross with equal arms inscribed in a square (as in the churches of Sta. Sophia and St. Mark), became the typical Byzantine plan. In these later buildings the cross lights and curved surfaces affording innumerable reflections, were particularly favourable for exhibiting the gold grounds. Hence mosaic was generally adopted by the Byzantines, and the best examples of it in Italy were due to Greek artists. Even in the time of Constantine, while the vaults of the church erected in memory of his daughter St. Constanza were covered with a poor mosaic, consisting of a pattern of trellis work, grapes and small figures, in black and dark green on a white ground, the dome of the church of St. George, at Salonica, was adorned with a series of mosaics—the finest of the Byzantine period, as regards design, execution and arrangement of colours. This latter church is circular in plan, with a projecting apse and radiating chapels in the thickness of the wall. The dome is seventy feet in diameter, and the whole surface of it is covered with pictures. These are in eight divisions, each filled with a grand architectonic composition, in which columns, arches, entablatures and apses are the chief features. In the centre of the picture there is generally a baldachino, on either side of which stands a saint or priest in dark robes, with his hands extended in the primitive attitude of prayer. The influence of classical traditions can be traced in these architectural back-grounds, which, to a certain extent, resemble those on the walls of the houses of Pompeii. Blue and red, of light and dark hues, are the colours chiefly employed in the cornices and entablatures. The back-grounds are all of gold. The edifices represented are of two storeys, lavishly adorned with pediments, angular and curved, loggias, porches and apses, hung with lamps and draperies; surmounted by birds of varied forms and colours, and supported by spiral, fluted and jewelled columns,

forming altogether a most interesting study for the architect and archæologist. You will be able to form some idea of them from the plates on the walls taken from a work on Byzantine Architecture, published by M. Texier and myself. The mosaics on the vaults of the chapels are not less worthy of attention. They consist of geometrical patterns, interlacing circles, squares and lozenges, enclosing fruits, flowers and birds. The outlines are generally of a dark reddish brown; blue is the predominating colour; green and white are more sparingly used.

In the mosaics of St. George we see the advantage of employing architectonic backgrounds; they relieve the blank space of the gold ground without interfering with the effect of the figures. Similar backgrounds are to be seen in some of the Roman Basilicas. There they generally symbolize the holy cities of Jerusalem and Bethlehem. We find them on the internal face of the chancel arch at St. Lorenzo (this before the restoration by Honorius, who reversed the position of the Basilica, was the external face) at Sta. Prassede, in the apse of St. Pudentiana, and in other places. Giotto was particularly partial to them. Most of the compartments of the frescoes in the Arena Chapel at Padua have buildings or canopies behind the figures—valuable illustrations of the architecture of his time. We see them at Santa Croce Arena by Taddeo Gaddi; but the most pleasing example of the use of canopies is in the background of the frescoes in the Chapter House of Sta. Maria Novella, where they give extreme richness to the whole composition. In all these instances the architectural forms are indicated by bold lines with but little shading, and not much attempt at perspective. This manner of treating them is infinitely preferable to that in which *chiaroscuro* and foreshortening were introduced, and which culminated in the extravagant colonnades and balconies with which the ceilings of some of the seventeenth century churches in Italy are decorated.

In modern practice these architectural backgrounds should always be designed by the architect, in accordance with the prevailing style of the building, and not left to the free fancy of the painter.

Salonica, which may be called, for the number of its churches and mosaics, the Ravenna of the East, abounds with fine Byzantine remains. All the churches were at the time of the Mahometan conquest converted into mosques, and to that circumstance we may attribute their preservation. The mosaics have in many cases been whitewashed;—the figures in the apse of St. George have been so treated—but that has been a preservative process.

The church of Sta. Sophia resembles, in many respects, its prototype at Constantinople. It was probably built in the time of Justinian, and by Anthemius. The central dome has a mosaic of the Ascension, inferior in character to the mosaics of St. George. In the centre there is a figure of our Lord, and around the Apostles standing between olive trees, and the Blessed Virgin attended by Angels. These figures are all in robes of purple, blue or green, and represented as standing on rocks of variegated colours—they are about twelve feet high. The apse has a colossal Virgin and Child on the couch, and its walls are covered with a pattern of squares alternating with oak leaves. The ground is grey, of an agreeable tone.

These are the chief mosaics of Salonica: others exist, but they are for the most part covered with plaster or whitewash, which it is to be hoped may be removed at no very distant period.

High up in a recess of the mountains which form the back-bone of the Island of Scio, lies the small monastery of Aghia Neamone, consisting of a quadrangle of rude cells, in the centre of which stands a fine church of the tenth century, decorated throughout with mosaics. The plan of the church is rather intricate. It has an octagonal nave, with semi-circular recesses in the thickness of the walls; a central apse, two apsidal chapels, a narthex and exo-narthex. The walls are lined throughout up to the springing of the domes and semi domes, with slabs of purple and sienna marble, separated into panels by billet moulds. The semi-domes over the semi-circular recess of the nave are filled with

pictures on gold ground, containing two or three figures each, the subjects are from the life of our Lord, the Annunciation, the Nativity, the Presentation in the Temple, &c. The bands over the arches have light foliated patterns; over each arch there is the head of a saint in a medallion; between the arches, the Evangelists and Cherubim. The principal dome was unfortunately destroyed in the Greek Revolution, and has been restored in the modern Greek style. The general tone of these mosaics is purplish. The narthex has a central dome with figures in arched compartments; the medallions in the pendentives are adorned with heads of saints. On either side there are barrel vaults with figures. The prevailing tone of these mosaics is dark green. They somewhat resemble those of the Baptistery of St. Mark, of which there is a sketch on the walls, and are probably later than those in the nave.

The decorations of Sta. Sophia have been so thoroughly described to you by Sir Digby Wyatt, that nothing more remains to be said about them. There are probably many other mosaics in remote spots in the East awaiting discovery by some chance traveller.

Ravenna, the metropolis of the Greek exarchs, is more Byzantine than Byzantium itself. It certainly possesses a finer series of ecclesiastical edifices than the capital of the Eastern empire, and as regards internal decoration, more interesting than those of Rome. The earliest of these is the Tomb of Galla Placidia, A.D. 441. It is cruciform in plan, the arms of the cross have barrel vaults, with pateras of green, yellow and red, on a dark blue ground. At the intersection there is a domical vault with stars; below, are the emblems of the Evangelists, and on the walls single figures.

To the same century belongs a beautiful little chapel in the Archbishop's Palace. The vault is groined, and has four figures of angels at the edges of the groinings supporting a central medallion with the monogram of Christ, in the spaces between the angles are figures of the Evangelists, and on the soffits, medallions with heads of saints. The colouring is similar to that of the tomb of Galla Placidia.

The ancient Baptistery of the Cathedral is octagonal, and is surmounted by a dome. Here there is no regular wall-lining of marble as in the two former buildings, but in its place there are two series of arcades. The lower of these is occupied alternately by semi-circular recesses and inlays of marble. In the spandrels there are figures in oval compartments, surrounded by foliage. The upper arcade has three unequal divisions in each bay, the centre being occupied by the window. The spandrels of these are also filled with foliage of rather a coarse character. Above, there are architectural decorations with columns and entablatures, rather like those of St. George, at Salonica. In the centre of the dome is a representation of the Baptism, with figures of the Apostles around.

San Vitale, built in the time of Justinian, retains its original polygonal plan, but none of its original decorations, except those of the chancel, on the walls of which are the celebrated mosaics of Justinian and Theodora, attended by courtiers. St. Apollinare Nuovo has been already noticed, but there is another church dedicated to the same local saint, a mile or two outside the walls, in a deserted spot not far from the gloomy Pineta. It is a fine Basilica of the second period, with rich mosaics in the apse, and medallion portraits over the nave arches. In its position and decoration it resembles St. Paul 'without the walls' at Rome, and like it, seems doomed to destruction by the elements. At the time of my visit, after heavy rain, water filled the crypt and flooded the aisles. There are many other mosaics in the city, but none so interesting as those mentioned.

St. Mark's of Venice, possesses the only complete series of purely Byzantine mosaics existing in Italy. These from description and illustration have become familiar to you all; but the mosaics of Palermo and Monreale, have so much Byzantine character about them, that they call for more than a passing notice, as they afford the most complete specimens of perfect decoration. The admixture of Saracenic form in the detail, gives them a peculiar *cachet* which no other churches possess. In neither

of them has restoration been carried out as far as in St. Mark's. The Capella Reale of Palermo so closely resembles the Cathedral of Monreale in style, that a short account of the latter will suffice.

The Cathedral of Monreale is transeptal in plan. The columns and wall-linings are of a grey streaked marble resembling cipolino. Rich strips of mosaic divide the marble slabs of the wall-linings into panels, and separate them from the pictures on the walls. Bands of floriated ornament run round the arches and divide the pictures on the walls of the nave. The subjects of these pictures are from Old Testament History up to the time of Jacob. Those in the aisles and transept from the New Testament. Above all there is a rich frieze of medallions filled with half-length figures of angels. In the central apse there is a colossal figure of Our Lord, with four majestic archangels at the sides. On the side walls of the chancel there are two rows of figures, Apostles above and Bishops below. The whole is crowned by an open roof resplendent with rich diapers. The prevailing colours of these mosaics are dark blue, light green, dark red and brown, all heightened with white on gold ground. In the Cathedral of Messina the roof is even richer in colour than that of Monreale; some idea of the character of the patterns may be gained from the drawings of them lent me by Professor Lewis. The other decorations have disappeared, with the exception of the colossal figure of the apse.

The system of decoration adopted in the Basilican and Byzantine Churches was somewhat similar. Ornamental pavement was ever a conspicuous feature in the ancient Basilica. This is evident from the name Gabbatha—the Pavement—given to the apse of the Basilica in Pilate's house, where our Lord was condemned. *Opus Alexandrinum* was almost universally employed both in the Christian Basilica and Byzantine church. It afforded a dark rich body of colour, as it was composed of circles and other figures of porphyry or serpentine, surrounded by inlays of similar marble, together with a dove-coloured marble called *palombara*. Of this description are the pavements of SS. Giovanni and Paolo, Sta. Croce in Gerusalemme, and that of San Lorenzo, which I am able to illustrate by Professor Lewis's careful drawing of it. I found upon making enquiry of the master workman who restored the pavement of Sta. Maria in Trastevere, that this sort of pavement is at present very expensive, chiefly on account of the difficulty of procuring the *palombara*, which can only be obtained from the excavation of ancient buildings, as there is no quarry of it open, and the small quantity used would not repay the search for a quarry. On account of its great cost, therefore, we are generally to be content with an imitation of it, and the best imitation is by the use of the mosaic called Veneziano, which is formed with small pieces of rich marble placed in patterns in a hard cement, and then ground down and polished. I have employed this in a church at Baveno, of which there is a drawing on the wall. I think with some modification it might be used for wall lining, in cases where the great cost of large slabs of marble cannot be incurred.

The walls were lined to a certain height with slabs of marble, with moulded cornice and string course, forming a dado, either plain, as in St. Mark's; in panels, separated by mosaics, as at Monreale; or divided by styles of a lighter colour and enriched mouldings, as at Aghia Neamone. These wall linings were generally simple veneers. The practice of veneering was common in Roman times. When excavating the year before last in a vineyard adjoining the Baths of Caracalla, I came upon a water conduit in which there were many fragments of Africano and Giallo antico, varying from one-eighth to an inch in thickness; pieces of the veneer with which the whole surface of the bath had been covered. Of this description were the wall linings of churches. Objection has been made to the use of veneers in modern work, but surely it is carrying our natural abhorrence of shams too far to refuse to make use of veneers because we cannot afford to use marble in blocks. This objection is as puerile as the declining to hide the face of honest but ugly red brick with a coat of plaster. I must confess that I think it perfectly justifiable to use either veneer of marble, variegated scagliola or coloured stucco, for the purpose of obtaining colour,

in cases where funds do not allow of the purchase of blocks of marble. Stucco is used with considerable effect in the church of St. Vincent de Paul, and other churches in Paris. There would be less sham in these methods of decoration than in the imitation of marble used by Giotto at Padua, Assisi, and by other Mediæval artists and architects, upon whose practice the opponents of so-called shams profess to base their principles.

Above the dado there were mosaic pictures, as at Monreale and the Capella Reale; frescoes, as at San Clemente, or inlaid patterns as at S. Demetrius, Salonica. It is most probable that frescoes were generally used in both nave and aisles, and that in the restorations which almost every Basilica has undergone they have disappeared, whilst the mosaics of the apse have been preserved.

The soffits of the nave arches in the Basilicas were enriched with coffers, as in St. Apollinare il Nuovo; in the Byzantine churches with rich interlacing patterns, as at Monreale and St. Mark's.

The roofs were either open, the timbers being covered with elaborate diapers, or they were flat ceilings, adorned with coffers and painted panels, like that shown in Professor Lewis's drawing of the ceiling of San Marcello. It cannot be positively asserted that a single example of the original flat ceiling exists either at Rome or Ravenna.

The apse, the chief feature of the Basilica, is preserved intact in many churches at Rome and Ravenna. The conch was invariably covered with mosaics. At Rome we have those of St. Pudentiana, probably of the fourth century; SS. Cosmo and Damian, of the sixth; St. Agnes, of the seventh; SS. Nereo and Achilleo, of the eighth; St. Prassede and Sta. Cecilia, of the ninth; St. Maria, in Trastevere, and San Clemente, of the tenth and eleventh; and Sta. Maria Maggiore and San Giovanni Laterano, of the thirteenth century.

In general there is a figure of our Lord (replaced in later times by the Virgin and Child), attended by the Saint to whom the church is dedicated, in the centre of the apse. We do not see the colossal Majesty except in Byzantine churches and Basilicas of a late date, as at Pisa, Messina and Trieste.

The finest and earliest apse is that of S. Pudentiana. It is often attributed to the time of Adrian III, A.D. 884, but the strictly classical togas, and the character of the houses in the background, which closely resemble those in the sculpture of the fifth century, afford I think sufficient evidence that the mosaic is of that period, though probably restored in sixteenth century. In the centre is a figure of our Lord, seated on a throne, with Saints at his side; behind are SS. Prassede and Pudentiana holding wreaths. The background is formed by houses, signifying probably the City of Rome. The general colour of the background is light blue with clouds, representing the sky, and on it are the emblems of the Evangelists.

After the apse the Triumphal Arch so called, because on it was represented the Triumph of Our Lord, was most conspicuous in the Basilica. The subjects on it were of Apocalyptic character. The best examples remaining are those of the Sta. Prassede; St. Paul's without the walls, and St. Lorenzo. In the Placidian mosaics of St. Paul's we see a head of our Saviour surrounded by the elders of the Revelations; at Sta. Prassede, our Lord with angels on each side and SS. Pudentiana and Prassede at his feet; a city, the gate of which is guarded by angels and a crowd of the faithful presenting offerings. Such was the Basilica in all its glory.

In the Byzantine church the central dome absorbed the artist's highest powers. The subjects depicted on it are various, at least in early times. Later, when fresco superseded mosaic, the iconographic arrangement throughout the whole edifice became fixed by rules, which are to be found in the "Manual of the painter," discovered at M^t Athos, by M. Didron, and translated by his companion M. Durand. Although written in the fifteenth or sixteenth century, this book contains a collection of formulas and receipts which had been handed down by tradition from the painters of the tenth and eleventh centuries. In consequence of the observance of these precepts the Byzantine decorations became of such a

stereotyped character that it is now very difficult to decide upon the date of any Greek painting, either from its forms or colours. We find the same saints at Venice, Mt. Athos and Megaspelion, whether of the tenth or fourteenth centuries. In the Manual, which should be in the hands of every church decorator, you will find receipts with minute details for the subjects on the domes, walls and apses of the church. It would take up too much time, even to indicate slightly the nature of these subjects. I think the study of it will be useful, for although it is not desirable that the stiff and formal figures of Byzantine saints should be resuscitated to appear upon the walls of our churches, it is desirable that we should have some principle of iconography adduced from Scripture and sanctioned by tradition, in order to avoid that confusion of subjects which results from everyone following the devices and desires of his own heart when he attempts to decorate a church with pictures of scriptural subjects.

In the second drawing I have represented a bay of a domed Byzantine church of a period between that of Sta. Sophia and that of St. Mark's.

On account of the vicissitudes which churches in the East have undergone it is difficult to trace the progress of church decoration there. As early as the twelfth century mosaic gave place to fresco in the churches of Trebizond, while in Italy it was revived by a school of Greek artists, and flourished there until the thirteenth century, being employed by them in the Baptistery of Florence, the Lateran, and Sta. Maria Maggiore. The Arabs were quick to perceive the beauties of mosaic, and they employed in the decoration of the Mosque of Omar of Jerusalem, one of the richest buildings for colour I ever saw. The few Byzantine churches which existed in Asia Minor were converted into mosques, and the mosaics either whitewashed or destroyed; but in Turkey in Europe, and Greece Proper, there are still many monasteries and churches which retain their original polychrome—such as those of Daphne and Megaspelion. These I have not visited, but I have seen some at Athens and other places, which have all the same character, with the harsh lines and fixed expressions, which were perpetuated with little variety or artistic skill. Although mosaic, as a means of decoration on a large scale, was superseded by fresco at the period mentioned, it was retained by the Cosmatis and others, for the decoration of furniture, particularly the ambones and baldachini of the Roman churches. Even in the works of Giotto and his School we see a lingering love of it in the imitation of it in the borders which separate their pictures.

Although the term basilica has been frequently applied to churches of large dimensions, built on a Basilican plan in any style, and to churches that have been rebuilt on the sites of ancient basilicas,—in which sense Santa Croce at Florence and St. Paul's of London may be included under their denomination,—I will not fatigue you by enumerating all the churches which may thus be comprehended under the general head of Basilica, but will direct your attention to a few buildings of the former class, which exist in Northern Italy, which deserve note as affording good models of decoration: these are San Maurizio at Milan, painted by Borgognone and Luini; the church at Sarrano by Gaudenzio Ferrari, and Luini, and St. Andrea at Vercelli by Ferrari. In all of these the decoration (chiefly consisting of figures) is of that refined and quiet style which prevailed before the style adopted by Michael Angelo became general, and which is so suitable for imitation in the decoration of our Renaissance churches; for it is to be hoped that before long many of the dismal looking churches erected in London during the last two centuries may be enlivened by polychrome. There is no city church, however ugly, that cannot be made beautiful by proper colouring. If gloomy, it may be illumined; if low, heightened in effect; if too lofty, lowered; even the necessary gallery fronts might be made ornamental, though this is perhaps a questionable advantage. In such buildings as these the severe mosaics of San Vitale would be out of place, but the frescoes of Luini and his contemporaries would be very suitable.

Before concluding permit me to describe briefly the manner in which I have attempted to revive Byzantine decoration in what may be called a semi-Byzantine Church at Baveno, the ornamentation of which is illustrated in the full-sized drawings on the walls. As I perceived that in all the earlier buildings bright positive colours were employed almost exclusively, and that tone or brilliancy were imparted to them by the use of lines of white or black, I adopted this practice as the principle of the colouring throughout. The walls are ground with yellow ochre, upon which there are foliated patterns in reddish brown. Bands of a blueish hue, relieved by pateras, divide the foliage at regular intervals. Borders of foliage on blue and green grounds run round the windows and doors. The tympana of the doors are filled with mosaics by Dr. Salviati, on gold grounds. The soffits of the arches are of geometrical patterns, in blue and green. The roofs are painted with arabesques in strong brown lines, with bright foliage, on the natural ground of the wood, which is Baltic timber, oiled and varnished. The columns are of granite; the pavement of Veneziano; the windows filled with stained glass by Clayton and Bell; and the pulpit, dado and steps of *rosso di Levante*, *Porto venere*, and grey Carrara marble; so that there is no part of the Church without colour. This universal prevalence of colour was common to the Byzantine churches, of which the building at Baveno is an imitation, though on account of the substitution of tempera for mosaic it is vastly inferior to them in effect.

THE PRESIDENT.—I hope this interesting subject will not be allowed to drop without remarks from gentlemen present. There must be some present who are intimate with these modes of decoration. Perhaps Mr. Newton will favour us with some remarks.

MR. C. T. NEWTON, C.B.—I should be very glad to communicate to this Institute any remarks worthy of your attention to night, but I feel I have no knowledge of the particular subject which has been the matter of Mr. Pullan's excellent discourse. There are one or two points I would mention. There is a mosque at Constantinople, I believe not generally known, which was a Byzantine church, which I once visited greatly to the terror of my *laquais de place* and at the risk of being pelted. The Turks at that time, 1863, did not like this mosque to be visited. It is near the so-called Palace of Belisarius, and the mosaics in it are not covered with whitewash, as is usually the case; it is therefore worth visiting even at the risk of incurring the displeasure of the populace. There is one more point I would mention. Mr. Pullan alluded to the facing of the less able materials with a finer material, such as stucco. I am not aware whether it is generally known that the ancients used very fine and durable stuccoes very largely in their architecture, and attained to great excellence in its application. I have in the course of my explorations at Halicarnassus come across some fine specimens of that stucco made of pounded marble, with ornaments painted on the surface, the colours were in admirable preservation; indeed, I have picked out of the water courses in Rhodes specimens of this stucco which still retained their painted ornaments, after long exposure to weather and rough treatment. I believe many of the edifices in the ancient city of Rhodes—a city celebrated for the beauty of its architecture—were built of coarse tufa or travertine, (the *Πόρινος λίθος* of Pausanias), faced with stucco. In this material the ancients sometimes imitated coloured marbles. As we are discussing the subject of mosaic decoration as applied to architecture, I would here mention that we have now an interesting collection of ancient mosaics in the British Museum, which you will find in the room called the Greco-Roman Basement, a room which I am sorry to say, is little better than a cellar. These mosaics which were obtained by Mr. Davis, in the course of excavations and by myself at Halicarnassus, at Carthage, are probably of the third century of the Christian era, and though the drawing of the figures is rude, the colouring is rich and harmonious, and the ornaments very effective.

MR. F. P. COCKERELL, Hon. Sec.—Following up Mr. Newton's remarks about the use of stucco, I dare

say many here will remember that the use of stucco by the ancients is not confined to the East. We find plenty of examples in Italy. There is one well-known example at Tivoli, in the Temple of Vesta. The stone of the columns is very deeply fluted, but the finished form of the flute was given by the stucco, which in this case is rather thick. But there is a remarkable Temple at Girgenti, which was destroyed at a very early date, and remained in ruins till some 25 or 30 years ago, when three of the columns were re-erected by a German artist. The columns are small, and composed of several drums, which are covered with a thin white stucco of uniform thickness, and having a very hard and highly smooth surface, after lying for centuries exposed to the weather and rough usage, the stucco was so perfect, that when the drums were put together, the jointings were scarcely visible, and it has a fine surface, almost a polish on it, to this day.

Mr. R. PHENÉ SPIERS, Associate.—The temple referred to by Mr. Cockerell is now called the Temple of *Castor and Pollux*, Three columns of one angle and a portion of the cornice are set up. The Temple of Concord is also stuccoed on the outside, as well as other temples there and at Pæstum. I believe the chief reason for the use of stucco in this case to have been that the stone being very rough and coarse, they could not otherwise get those fine mouldings which they were accustomed to obtain in marble; for you find the mouldings in stucco as fine as those of any of the marble Temples of Greece.

Mr. W. WHITE, F.S.A., Fellow.—Mr. Pullan has treated the subject in such a descriptive manner, without drawing many principles from it, that it is rather difficult to discuss as a matter of principle, or to comment much upon it. The one principle he has suggested of using positive colouring, relieved by black and white, is I consider, a most valuable principle, which we ought more generally to follow than we do at present. It seems that Mr. Pullan condemns what many of us use; namely, the facing of the interiors of churches with red and buff brick: but he speaks of that as though the red and buff brick were the ultimate finish supposed to be intended by their use. Such an ultimate finish I should protest against, for though I have used red and buff bricks myself, it is only as a groundwork, and in my opinion an admirable groundwork, for colour, especially in this country, where we know how many failures there have been from the use of any description of plaster on wall surfaces. This is the more important, because the brick will form a good groundwork, without coating of other colour. The coating of other colour upon a plastered wall on which the pattern is to be painted, will often aid in throwing off the pattern itself. If there is no chance for the moisture to exude except through the first colour wash, which is put over the whole surface, it will perhaps throw off the colour altogether. With reference to the other point of the use of stucco, all or nearly all our old churches were covered internally with a fine wash of plaster or gesso, or whatever it is called, as a preliminary coating to make everything very smooth for the colour-decoration. But this is a different matter to that which has been spoken of, in respect of the use of stamped or moulded stucco. I remember that some of the arched vaultings of one of the ancient palaces of Rome were covered with modelled plaster-work, which was apparently intended to receive colour also. The chief object of my rising is to propose a vote of thanks to Mr. Pullan, which I have great pleasure in doing.

Mr. F. C. PENROSE, M.A., Fellow.—I have great pleasure in seconding the vote, and I think the Institute is to be congratulated on having a paper brought before it illustrated in so admirable a manner and so clearly and logically explained. I believe Mr. Boulnois has seen the completion of the church at Baveno, and he will, I hope, give some description of it, whereas I only saw it at its comparative commencement when the roof was just put on, and I could only judge what it promised to be, and an excellent promise it gave. I am very glad to hear it is the opinion of the gentleman who last spoke that the coloured bricks which we often see used for the interior walls of churches should be only looked upon as the future ground for painted decoration; for in themselves they appear to me crude,

unfinished, and distracting, though sometimes used with great cleverness. But I am afraid we cannot hope in all cases that such a decorated colouring is intended, because I have seen in several restored churches, and have grieved over the walls left so rough after the removal of the plaster as not even to be suitable for garden fruit walls. I am persuaded that rough walling of this description, *i. e.*, without stucco and merely pointed in the interior of a church, could never have been intended by any people who had arrived at a full understanding of what they were aiming at. I am extremely glad to hear the north of Italy spoken of as the region where we may get our best lessons in decoration. The Church of Soronno is an admirable instance, and perhaps Mr. Pullan did not see what he would otherwise probably have mentioned the Church of Varallo, where the decoration is of a kindred kind, and also by Gaudenzio Ferrari, and I am told that the Church of Lugano is also magnificently painted by Luini. I think Mr. Pullan spoke very justly of veneering. It is no doubt admirable in its proper place, when confined in panels or lines, which give a sufficient appearance of solidity to the walls, and under those conditions is an excellent means of forming suitable wall ornament for subordinate parts.

MR. BOULNOIS, Fellow.—I rise just to say that Mr. Pullan has very modestly introduced the church at Baveno, which he designed and built, and it behoves anybody who knows that church to say how exceedingly successful it is. He told you the colours were placed upon woodwork, which was simply oiled and varnished; and it is not too much, I think, to say—and I appeal to anyone who has been there—that the colouring in that church revives all the feeling which everybody experiences who has visited well-painted churches of the mediæval age. The effect is something which we do not see in this country. There is none of the coldness and none of the attempt at doing what the materials do not permit, which is so frequent here, and the tone of the colouring throughout is excellent. The dado, as we call it, of that church is executed in the simplest way in the world, with a grey marble of the country, and the effect is most excellent. These decorations of which you see the drawings on a white ground if placed on a ground of bright stained wood varnished would have, you may imagine, a better effect. The brown colour is more brilliant a good deal than is shown here, and the tracery is very clearly exhibited in every way. I should like to mention on the subject of stucco that long ago (it was, I think, in the old Rooms of the Institute), there was a question raised as to the use of stucco on some of the earliest buildings of English architecture, and I remember the discussion between Mr. Benjamin Ferrey and, I think, Mr. Talbot Bury, as to how far stucco had existed upon the outside of the church of Little Mapleston, one of the earliest churches in England, and the Temple Church. There was, no doubt, stucco on the outside of the flint stones of these churches. Stucco is quite ancient in its use externally, and its use is now a great deal more suitable in many places upon plain surfaces to form a simple covering than that of a poor material adopted simply because it is true. With regard to the picture in the church at Lugano, I may mention that the great painting there is by Luini.

MR. J. D. CRACE, Contributing Visitor.—I would desire to add my personal thanks to Mr. Pullan for his Paper. I have recently visited some of the places mentioned, and am glad to add my testimony to the value of his Paper, which not only tabulates many of the most interesting characteristics of various periods of Byzantine ornament, but also gives an extremely interesting description of those monuments. Mr. Newton mentioned a little mosque at Constantinople, which I have visited, and I would say the mosaics in that mosque are worthy the study of any one who happens to be in Constantinople. The best mosaics existing there are in two or three small domes, which are of the scallop section. This gives the greatest richness to the effect of the gold grounds, because each scallop of the dome has its own gradation of light, which gives an extremely rich variety of tone to the gold. Mr. Pullan did not refer, so far as I gathered, to the extraordinary beauty of the figure drawing at Ravenna. All those which date earlier than the middle of the fifth century, are so remarkably full of

feeling, that everybody who contemplates working on figure subjects in churches in this country cannot do better than go to the churches at Ravenna for study. Not only the drawing but the shading is much more carefully studied, than appears at first sight. It is broad with regard to the general effect, but extremely fine with regard to the expressive detail. For instance, the white draperies are not broken up to the extent of spoiling the effect by shades; but if the white is intended to represent a thin material, you will find it clearly and artistically so represented. The figures themselves were by no means in stereotyped attitudes; and the posing of the hands and feet is admirable. This is one point which must strike anybody who has studied the Ravenna work from an artistic point of view. Reference has been made to stucco, and as nobody has mentioned it, I may state that stucco is found upon some of the oldest monuments of Egypt. Some, if not all, of the tombs of the kings, and the Temple of Medcenet Haboo, are coated with it, and the colouring is entirely executed on the stucco.

MR. LEWIS SOLOMON, Associate.—Mr. Pullan speaks of the rich marbles and the rich stained glass. I should like to know what proportion of ground or clear white glass he found in these buildings?

MR. PULLAN.—In the Mosque of Omar there is no white glass whatever. The foliage is represented on coloured glass, inlaid in stone or cement. The divisions are of great thickness—sometimes two inches. In all Byzantine buildings and in modern Turkish buildings, there is very little white glass, but almost all coloured. With regard to principles: I had, not long ago, an opportunity of lecturing to the junior members of the profession, and then I ventured to put forth my principles for the purpose, to an extent of enunciating my ideas. I also put before them examples; and being of the age of discretion, they were competent to form their own judgment. I also spoke before a Dilettante society at Canterbury; to them I spoke in a more dilettante fashion. Mr. White must therefore excuse me for not enunciating any principles on the present occasion.

MR. CRACE.—If I may be pardoned the irregularity of speaking twice, I would mention one point in the Mosque of Omar, at Jerusalem, which has only been recently known, and that is the remarkable way in which the tesserae of the mosaics are set. They are set at a peculiar angle—not in the plane of the surface, but at a slight inclination, which is so observable throughout the work, that it must have been done with the distinct intention of taking the light with peculiar effect. I think that this has not been noticed before. M. Ganneau discovered the peculiarity when examining the Mosque for the Palestine Exploration Fund.

THE PRESIDENT.—It is with much pleasure I convey to Mr. Pullan the hearty thanks of this Meeting for his instructive Paper. I have little or nothing to add to what has been said, as I did not succeed in following the subject so perfectly as I could have wished, but I shall read the paper with great care when it is printed. At present I do not recollect all points touched upon so readily as I ought, but it is a subject in which I take very great interest. I have given much attention to both of the forms of architecture treated of in Italy. At Venice and at Ravenna I have closely examined the buildings Mr. Pullan has spoken of, and I can thoroughly endorse what has been said about them. They are wonderful in their interest and beauty, and, as Mr. Crace says, the drawing of the figures is often very excellent; particularly in the oldest buildings, as the great Baptistery, and the beautiful little chapel in the Bishop's Palace, which is only a little later. With regard to the use of stucco, I think no one has objected to stucco in the abstract, whether within or without, because all churches in which stone could not be afforded, are universally stuccoed internally, and very many of them externally also. I some years back made a survey of the churches on estates of the Duke of Newcastle in Notts. These churches are usually of several different dates, but I usually found the earliest portions of them stuccoed on the outside, so that on approaching the churches one could distinguish the older parts at first sight by the plaster which coated their walls. I think the objection is raised rather to that mode of using

stucco which is common amongst speculative builders and others in this country; scoring it over with lines to make it to look like stone, and some objection of the same kind may be brought against the use of marble slabs or veneers, for the coating of internal walls. These buildings at Ravenna are usually to a certain height slabbed with marble, but they do not imitate construction in that material at all; but are obviously decorative, the slabs being placed vertically, not like courses of stone. To make them look like construction I think is objectionable. The whole of the interior of the Baths of Caracalla, I think, was faced with marble. It was supported by thin slabs let into the wall projecting about two inches, and on these shelves the slabs were placed; but all these slabs which coated the wall have fallen off, and you see now only the shelves built into the wall to receive them. That is no sham, nor have I seen (that I can recollect) anything like a sham in the use of facing with marble in any ancient buildings; for as I have observed it is used as decoration and not in imitation of construction. I daresay, however, you may find many things in Roman as well as in mediæval building which *do* come justly under the head of imitative or counterfeit construction or decoration; but it is another question whether these should be taken as precedents. In buildings, as in men, it is their *merits* not their *faults* which are worthy of our imitation.*

An unanimous vote of thanks was then passed to Mr. Pullan for his interesting Paper.

* I cannot but regret (and I almost think he will do so too) that a man whose influence is justly so great as that of Mr. Pullan, should have earned a worthless cheer at the expense of encouraging one of the greatest practical vices of modern art as well as modern commerce and manufactures. It may be that those who have so nobly lifted up their voices against this gangrene of modern architecture have fallen into the opposite error of purism; but, surely, in these days, when every kind of counterfeit, adulteration, and practical falsehood pervades every branch of business, of art, and of manufacture; when financial securities are proving to be myths, when our food, and wines, and medicines are found to be other than they pretend; and when architectural art is so largely a mere travesty of what it professes to be, *it is not the time* to jeer at those who may possibly overstrain their protests against the practical vices of their age!

We may, it is true, see shams, to our satiation, at Pompeii; but we see plenty of other things there which we should blush to defend. We see them also at Rome; but "*Quid Romæ faciam? mentiri nescio*"; and we see them, as mentioned by Mr. Pullan, in the works of mediæval painters and architects in Italy, but they may, perhaps, be elassed with those speculations in which early Christian writers indulged, but which they would probably have avoided had they known to what fallacies they would in after times give rise. Anyhow, I feel that Mr. Pullan will, on second thoughts, agree with me in thinking that *these are not the days* in which protests against untruthfulness should be held up to scorn!

I trust that I shall be forgiven for offering these remarks, which have occurred to me since the Meeting, but I could not in conscience abstain from making them.—G. G. S.

ERRATA IN SESSIONAL PAPER No. 1, 1875-76, pages 1 & 2.

Professor DONALDSON requests, in order to correct certain inaccuracies in the concluding remarks, which he made on the presentation of Mr. T. H. Wyatt's portrait, that the following paragraph may be substituted.

They must recollect, that he had been called to execute great works, among which might be mentioned the Basilica Church, erected at the expense of Sydney Herbert Esq. (afterwards Lord Herbert of Lea), one of the finest monuments of modern art in the Italian style that was to be found; showing the great beauty of that class of building, and how appropriately it could be introduced in this country. The Church at Bemerton was subsequently erected to the memory of George Herbert the poet and divine, from his design. He had also carried out the Exchange Buildings at Liverpool with a magnificence of design and affluence of materials worthy of the purposes to which they were appropriated. These, together with many other works, gave Mr. Wyatt his place in the history of English architecture. They now possessed the portrait of the man *as he is*; a striking likeness. It showed the character that belonged to him, with an agreeable expression, and which, as a work of art, it must ever be a pleasure for the members to contemplate. The portraits of the other Past-Presidents, with this, formed a complete series of those, who have attained the position which Mr. Wyatt occupied.

The following Paper was translated and read by Mr. W. A. BOULNOIS, Fellow.—

A DESCRIPTION OF THE BUILDING ADOPTED BY THE SPANISH GOVERNMENT FOR THE GREAT EXHIBITION AT MADRID.

Designed by M. EDOUARD COLIBERT, architect, late agent to the Duke of Wellington, in Spain.

INTRODUCTION.

The services rendered by International Exhibitions to the nations which have organised them, are too large and too important for it to be necessary to dwell on their utility. Unfortunately these undertakings necessitate such immense expenditure that the profits arising have hitherto scarcely ever been sufficient to cover the outlay.

The condition of the finances in Spain rendering it impossible for the Government to meet the difficulty with public money, it became necessary to find means for the construction of an edifice which should cost the State nothing, and at the same time offer to capitalists the prospects of profits exempt from the risks which ordinarily attach to these enterprises.

The author of the design before you endeavoured to resolve this difficult problem by adopting a special sort of construction which should permit *concessionaires* to transform the projected Palace after the closing of the Exhibition into a number of small constructions or buildings, independent one of another, and available for industrial purposes throughout the country. By the plan which has been adopted, the realization of the value of the principal materials of the Palace, has been assured at prices greater than their cost.

DESCRIPTION OF THE PALACE.

The design presents on plan the form of a vast parallelogram terminated in a hemicycle, and occupying a surface of 33,905 square metres, or nearly 400,000 supl. feet. This surface can be enlarged at pleasure without changing the construction of the edifice, by prolonging the number of the galleries.

The interior is composed of a single hall divided into five naves, or parallel galleries, of differing dimensions. This disposition permits the classification of the articles exposed according to their size, their category, and their nationality, in effect, by uniting in one or in many transverse alleys the industrial products belonging to any particular nation; and placing similar objects in the longitudinal alignment, a method of exposition and comparison is obtained at once the most easy and expeditious. The hemicycle, or semi-circular termination, containing the same number of radial divisions as the rectangular part of the plan, will comprise the international exposition of the fine arts, in which the objects will be placed in the same order as the industrial products.

This arrangement enables the visitor to examine all objects of similar classification without having to seek them, by simply walking longitudinally, or, on the other hand, all the different objects sent by the same nation, by walking transversely.

In addition to the Annex Garden, that of the Buen Retiro, an interior garden is provided for the display of objects which require uncovered space, such as hydraulic machines, fountains, models of economic houses, tents, &c. Two steam-engine rooms will be placed on one of the sides of the

edifice, and the shafting for transmission of power will be fixed on the side enclosures. The offices of the administration are established inside, behind the wall of the principal elevation.

The central gallery or nave will be thirty metres high, and the smallest gallery will be ten metres in height, the total length of the Palace will be 300 metres, and its breadth 120 metres, or in English feet about 1000 in length by about 400 feet in breadth.

The exterior form of the Façade follows the form of the interior galleries of the Palace. It will be decorated by the application of Spanish faence ware upon the brickwork in mortar, all the ornaments balustrades, and sculpture, being in *terra cotta*.

Five doors are arranged for the public exit and entry ; three upon the principal *façade* and two upon the sides of the building.

MODE OF CONSTRUCTION—TAKING DOWN AND RE-USE OF THE MATERIALS.

The materials of the building will be cast and wrought iron ; the roof coverings, partly in glass and partly in light tiles of the country. Each compartment or bay of the galleries comprised between the columns, which sustain it, will be insulated in its construction, and adjoined to the other divisions by means of collars and bolts. At the termination of the Exposition the removal of these collars and bolts will suffice to divide the entire edifice into as many independent constructions as there are divisions between the columns. After this simple operation of disarticulation the Exhibition Palace will be found transformed into a series of railway stations, of rotundas for the shelter of locomotives, and of covered markets, with which many of the principal cities in Spain are not yet provided.

Thus constructed, and thus taken down, and resold, the Palace of the Exhibition costs the Spanish Government literally nothing, while the *concessionaires*, beyond recovering their outlay, will gain by the exemption of duty upon the import of materials which are as much as 20° *ad valorem*, and other privileges are secured to them, such as the monopoly of refreshments.

The author believes that this idea of special disarticulation which has governed his design is applicable in many ways to other kinds of temporary erections, and it is with the object of bringing out the best methods for the re-employment of the materials of construction, that he has availed himself of the honour of submitting his work to the appreciation of his honourable colleagues of the Royal Institute of British Architects.

Mr. EDWARD HALL, F.S.A., Visitor.—I may perhaps be permitted to say one or two words with reference to the design of this building. Inasmuch as the plan is put before us as a result of the study of all previous exhibition-buildings, the design involves matter of great interest. It, however, appears to me that we do not derive from inspection of what is before us information of any particular value. The arrangement, so far as shown, presents no difference from that of the parallelogramatic plan originally suggested for the Paris Exhibition of 1867, which all who have paid any attention to the subject will recollect was in no essential respect modified in the building erected, which had semicircular ends. The principle of plan of the building of 1867, and likewise of the original design, was division of the length of the building into countries, and of the breadth of the building into classes, of the exhibited articles. The theory was that at each inspection, with one sort of end in view, you would walk lengthways of the building, keeping within a space occupied by articles of the same class, as, for example, railway appliances, and would cross the spaces of the countries, and be able to compare with the greatest facility the articles of the class exhibited by the different countries, or for another sort of end, would walk breadthways, keeping within a country, and seeing articles belonging to all the classes contributed to by that country.

I was for some time on the council of the Workman's International Exhibition, which was held at the Agricultural Hall, when the original idea was that the classification should be arranged on the same principle as that proposed for the Paris Exhibition of 1867. From the first I doubted whether the theory of the planning would be practically exemplified. It must be confessed to have broken down most ignominiously, and I believe it always has. Really, it broke down in the Exhibition of 1867. You will recollect that the integrity of each class, or division, was in no case thoroughly kept throughout the circuit; for example, the centre circuit was intended to be devoted to the History of Art; but it could be so only in part. You will call to mind that various other portions of the classification trespassed upon that intended for the central circuit; whilst generally, in the Exhibition, the intention of the planning was by no means strictly adhered to in arrangement of the articles. There is this difficulty, with others, in all cases: whereas you intend to receive from particular countries a number of goods to fill a particular space, either there arrive at the time fixed a number which will only fill perhaps half the space, or, by some miscalculation, the articles exceed the space. Instead of receiving, say railway appliances, calculated to fill the allotted portion of the building, you receive only what will entail a disadvantageous void; or you are obliged to deviate from the prescribed arrangement to the extent of providing some outlying area, or trespassing upon some adjoining space; which, with the preservation of the requisite ways for the circulation of crowds, will involve upsetting of your designed arrangement, if not confusion of more kinds than one. Therefore, to expect that the particular plan before us could possibly be adhered to in the eventual arrangements, would be, I am quite sure, a fallacy. I consider it has by no means solved the difficulty of planning these International Exhibitions. It would be possible, with sufficient time, and by very careful arrangement of the articles received, to allow of trespass of one class or nation, into space adjoining, originally designed for another class or nation, and, by establishing more than usually visible demarcation by some features added to the construction or decoration of the building, to prevent that muddling of the ideas of those examining the exhibited articles, which is so generally produced; but I do not see in the plan before us the slightest indication of diminution of the difficulty which has been felt in previous exhibitions, as regards arrangement of the articles in such manner as would ensure the realization of the more important aims of these exhibitions.

THE PRESIDENT.—The great feature in the scheme appears to be the facility with which the building can be taken down and afterwards disposed of in sections.

Mr. BOULNOIS.—The great point in which I consider M. Colibert has been successful, and which I do not think those who have hitherto dealt with iron buildings have dealt with, is that he has made each division a separate construction which will stand alone. He has put double columns in every place, and, where needed, four columns at the hemicycle. Each portion of the building can be taken down and put up again where required, and the whole structure is made to fit one part into another. It is available by disintegration for all sorts of purposes. That is the principle of the thing. The general design is not particularly novel, but the adaptation of the structure to disarticulation is a novelty. It is not a thing for which the architect could take out a patent for, but I do not think anybody has done it before. It is for this that I am glad to give M. Colibert what the French call *bon accueil*, and to lay the plan before this Institute. Of course the classification of the articles could be arranged in almost any structure.

After a few further remarks a vote of thanks was passed to M. Colibert and to Mr. Boulnois for their communication, and the Meeting then adjourned.

Royal Institute of British Architects.

SESSION 1875-6.

At the Ordinary General Meeting of the Institute, held on Monday the 29th of November, 1875,
Sir GILBERT SCOTT, R.A., President, in the Chair, the following Paper was read :—

NOTES ON ANCIENT AND MODERN EGYPT.

By Professor T. H. LEWIS, F.S.A., Fellow.

THE notes from which the following Paper is taken were made during a somewhat hasty visit to Egypt, when I was not in very good health, and in the hottest part of the year, and I wrote it simply to fill up a gap which seemed likely to occur last session in our Lectures. I put off the Paper from time to time, as others, which I thought likely to be of more interest, were offered, and I give it now merely because no other of the same kind presented itself.

Few discoveries of importance have been made in Egypt since those chronicled by Professor Donaldson in the excellent Paper which he read here in 1860, and many have been described by Monsieur Mariette in his *Journey to Upper Egypt* and his *Boolák Catalogue*, and by Mr. Eaton, in the new edition of Murray's hand-book; so I shall allude to them very briefly. One deeply interesting subject I shall merely put on record,—I mean the supposed identification of Rameses, (the treasure city and starting point of the Exodus) with Tanis or Zoan, which would completely alter the generally accepted route of the Israelites. The site of Rameses has, usually, been placed between Zagazig and Ismailia, some 30 miles north of Cairo, and the generally accepted site of the passage of the Red Sea is at Chalouf, between Suez and the Bitter Lakes, some 12 miles north of the present head of the Red Sea. Brugsch Bey believes that the Israelites started from Tanis, Zan or Zoan, and turned to the north, and that the overthrow of the Egyptians took place close to the Mediterranean, and in or near the famous Lake Serbonis. Then the Israelites turned South again to the present Bitter Lakes, which are no other than the still more famous bitter waters of Marah. This theory is in great part, at least, accepted by Monsieur Mariette, and by our most eminent Egyptologists—notably, I believe, by Dr. Birch.

One other subject to which I shall briefly allude is that of flint implements—a very important study now with every archæologist. Many specimens of them from Egypt and Assyria are in our museum; but it fell to my lot to find quite by accident, a more delicate specimen than there is even in the Egyptian Museum at Boolák. I found it at Sakkarah, the most ancient cemetery in Egypt, amongst the remains of a pyramid of sun-dried bricks: and of course, if I had not known exactly what it was, I should not have noticed it at all. It is a delicate flint saw, showing distinctly the teeth; although of course, their sharp ends are broken off. The trouble of working this material to such a shape must have been very great; and this saw must have been made either when the working of metal was little known, or when the use of the flint was traditionally sacred.

I come now to more technical works. I suppose that the most marked discovery since Professor Donaldson read his Paper here in 1861, has been that of the Tablet, now in the Museum of Boolák, which records the repair of the Temple of the Sphinx. The Tablet is beautifully and sharply cut, and almost

perfect. Whether it be contemporaneous, as is supposed, with Cheops or not, it records the restoration of the Temple of the Sphinx by him, and thus the Sphinx may be more ancient, beyond conception, than the Great Pyramid. But the text of the tablet has not, I think, been published, and its date is not clearly known. As to the Pyramid itself, the most important recent discovery is that made by my friend Mr. Dixon and Dr. Grant, viz.: of passages from the Queen's Chamber, apparently for ventilation, just as in the King's, but there was no opening from them into the chamber, and they were discovered only from some peculiar jointing in the masonry. They are about 9 inches square, and not in straight lines from the ends, but go about 7 feet horizontally, and then ascend at an angle of about 33°. They have not yet been traced far above 30 feet in length. From their opening into the chambers having been stopped up, I apprehend that they had been used for ventilation during the works, and that when the chamber was finished and the air shafts not needed, they had been stopped up and the masonry of the chamber completed. Of the subterranean temple, south-east of the Great Sphinx, a sketch plan and description were given by Professor Donaldson. They are wonderfully accurate, considering the difficulties under which he lay in taking his measurements, and I have merely added slightly to his plan, in order to complete it. All the covering is off the top, but large slabs of stone could easily have been laid, and were so no doubt, from the huge granite architraves which still span the spaces between the piers. But these splendid masses of granite are grievously broken away at every joint, no doubt by the Arabs, in order to get at the metal dowels. Whatever the covering, there was a grand super-structure, as the sides of the rocks all round are lined with finely polished alabaster.*

But a very interesting discovery has been made in clearing out the deep well, noticed by Professor Donaldson. For in it there have been found nine statues of Chephren or Shafra, the monarch of the second pyramid, and of his date or nearly so. The most remarkable of these is carved in diorite, a plutonic stone, much like the green stone of which the huge rock of Penmaenmaur in N. Wales is formed. It is harder than serpentine or granite, yet the old Egyptians have given to it as beautiful a surface as if it were marble. A statue of a date so remote, and in so refractory a material must, in any case, be worthy of note; but the beauty of its execution is something marvellous. I had not the slightest notion of what Egyptian sculptors could do until I saw this. An enthusiastic antiquary like Monsieur Mariette, may, perhaps, be supposed to exaggerate in the case of a discovery of his own. I therefore take the words of Professor Owen, who speaks as a cool observer, a man of science as well as of art. He says: "The trunk, in anatomical truth, is equal to the work of Michael Angelo. The arms and legs are finely natural. The whole is by a portrait sculptor, never surpassed since." Another statue of wood, of the same date, is described by him as "perfectly modelled, and with easy natural pose." Yet this was centuries before the Greeks began work, even in its most archaic form. But we may go further back than this. A statue of Ra-Hotep of the third dynasty, is described as being "bolder and more natural in style than the later." These sculptures and such others as those in the tomb of Tih at Sakkarah, shew that Egyptian sculpture would probably have taken as high a position as Greek, were it not for the strictly conventional forms imposed on it by custom. But if it be said that this custom was the result of the religious feeling, I answer that were it were not for the mighty, ennobling feelings of religion, we should not have had this grand sculpture at all.

* I ought to mention in justice to that able archæologist, Monsieur Mariette, that things have been changed, much for the better, since Professor Donaldson's visit. I found not the least hindrance to my taking sketches and measurement; and we owe to Monsieur Mariette a better and more exhaustive catalogue, viz.: of the Boolák Museum, than that of any museum with which I am acquainted.

We have here, so far as I can see, sculpture vastly in advance of architecture. For the highest efforts of the sculptor seem to have been put forth in the fourth dynasty, whereas no remains worthy of the Egyptian architect exist, so far as I know, before the Beni Hassan caves of the 12th. This is quite contrary to what we know of the grandest examples of Grecian art. In Egina and Selinus its Doric architecture was fully developed, whilst at Egina its sculpture was stiff, and at Selinus simply barbarous. The grandest discovery of modern times—the tomb vaults of the bull Apis at Sakkarah—has been so well described by Professor Donaldson, that I need only add that its wonderful excavations afford us the earliest examples of a “sham;” the upper part of each arch being plastered and lined to imitate blocks of stone. I ought to mention also that in this monument we have the earliest tool marks, I suppose, known—a very important subject, as those know well who are concerned in the Palestine Exploration. At the Serapeum the tool marks are perfectly distinct. The surface of the cut rock looks like scales, the marks being made with a circular headed chisel, as is clearly shewn by my rubbing of them.

I may now allude to a find of my own of some little interest. Near the great pyramids of Geezeh are many built tombs of the old Empire, oblong on plan, with sloping slides, ending abruptly at some 20 or 30 feet in height, with a level platform. From this there usually descend one or two pits leading to mummy chambers. These are structures not likely to be visited by an ordinary traveller, as there is so much all around of more historical interest. I wished to ascertain if any marks remained on these level platforms to shew what was the nature of the chapel or other covering (no doubt grand) which protected the tops of the mummy pits. But my search was fruitless, and doubtless the friction of the desert sand had removed all marks on the masonry, just as it has effaced all polish from one side of Pompey's pillar at Alexandria. However in making very close scrutiny I noticed holes in one of the platforms and saw that there was a hollow cave 10 feet or so deep under. Not only so, but that the stones at the sides of the openings were cut as voussoirs. I was in company with Mr. Haynes, who had charge of the great harbour works at Alexandria, and by the help of the Arabs we dropped down into the hollow. We then found ourselves in a chamber some 16 feet wide, but the ends irregular and heaped with sand, so that no precise length could be taken. It had a flat ceiling, of one single row of stones about 4 feet thick, which was quite firm, except where the holes were broken through, and without pier or support of any kind except the side walls. The upper part was very slightly rounded, forming the almost level platform, and such of the stones as I could see were cut roughly as voussoirs. We were both very fatigued, and so merely made a few sketches and resolved to examine the place again. But I was unable to find time for this. Thinking however afterwards, of the singularity of the work at so remote an age (for it dates back from the fifth dynasty), I asked Mr. Dixon who came shortly afterwards to England, to measure it for me when he returned. He very kindly, took the trouble to go expressly to the Pyramids with Dr. Grant and Mr. Haynes, arriving there at 2 o'clock in the morning to avoid the heat, and you have the result in that drawing. I give the description in his own words “The builders, wishing to give the upper surface “a slight curve, cut the sides of the stones in lines corresponding with the radius of the “curve which they were making, and so formed a correct arch. But in some cases they tapered the “stones too much, so that here and there they tapered the wrong way.” And in another letter he says “I agree with your suggestion that in any other place or date you would have described it as an “attempt to copy an arch by ignorant workmen.” Whatever you may call this covering, it is, so far as I know, the only ancient structure of the kind existing, and if it do not shew a knowledge (rudimentary if you will) of the principle of the arch I know of no other principle on which it could

have been constructed and upheld for more centuries than I care to guess at. If it be an arch, as it seems to be, it is the very earliest one known.

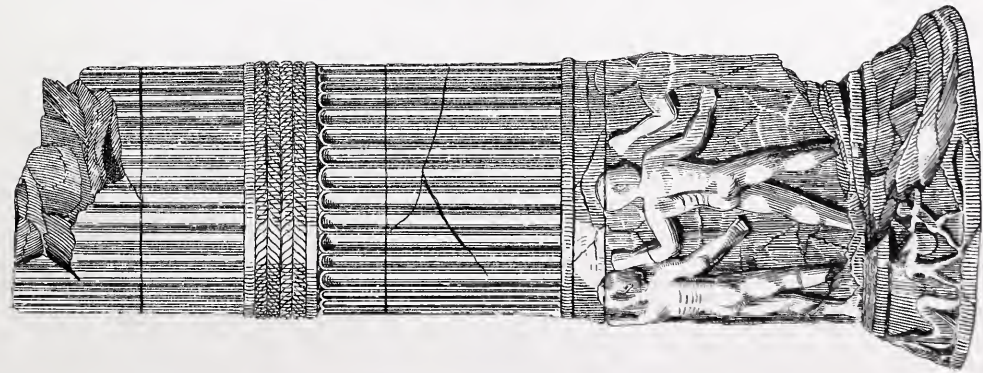
Possibly this structure may help to explain the difficulty as to the covering of Campbell's tomb—a singular excavation 53 ft. 6 in. deep and 26 ft. 3 in. wide now open to the sky, but which must have been covered in some way, although the position of the tomb itself shews that the roof could not have been supported by a central pillar. In fact Mr. Perring supposed that it was arched, and thought that he detected a springing stone. If there were one it has been removed since. I could not at least find a trace of it. But that the side passages were arched Mr. Perring considered that he had clear evidence.

Before leaving the works of ancient Egypt I would call attention to one or two subjects which seem to me of interest connected with Greek work. I found, rather to my surprise, that these had not attracted the notice of some of my friends whose studies had been amongst classic works. So I give a short notice of them here. The first regards some sculptured columns in the southern parts of Nubia, and which I know only from the drawings in Lepsius. They are at Naga, in the Wadi al Sofîâ, about 70 miles North of Khartoum, and more than 500 miles South of the first cataract, and far beyond any place noted in any guide-book I know. There is a large mass of ruins, consisting of several buildings, the chief being evidently of a Temple. It has several columns, but of these only three have been sculptured—one or perhaps two of them may be ranked, to some extent, with the ordinary Egyptian sculptured columns, but the third is decidedly distinct from it, and as decidedly Greek, resembling in its most important features the celebrated sculptured columns of Ephesus. Lepsius gives no description of them in the history of his discoveries, but alludes to them in the letter-press to his splendid engravings, and they may be assigned to the time of Ergamenes, in whose time C. 300 (Ptolemy Philadelphus) Greek art was cultivated in Nubia. Caillaud (voyage 1823) gives a drawing which corresponds very closely with that of Lepsius, and describes the column as almost entirely Greek, having six nude figures of this style. Another column he describes as having figures in full relief and Egyptian in style. Hoskins in his *Travels in Nubia*, 1835, speaks in much the same way, though not so decidedly. These facts may be well known to many here, but that sculptures such as these should be found in one place 500 miles South of Egypt, and in another at Ephesus, and at these two places only so far as I know, and that both were by Greek artists, and of a date within apparently some 30 years of each other, is a fact worth a few notes in an architectural paper on Egypt.

Again as to the origin of the lion-headed chairs so common in Greek work, and so clearly indicated in the grand description of Solomon's glory, 1st Kings, II c. 20 v. We know that under the Old Empire of Egypt the ordinary mode of riding was on a sort of seat strapped between two animals. This may or may not have given rise to the representations in Egyptian sculpture, but there we often see a chief personage seated, and by his side (one side only being seen) is a lion or other animal with a kind of saddle-cloth hiding the body, the head and limbs only being seen. Lepsius gives many examples. In a later painting given by Rossellini, the animal becomes conventionalized, the body elongated, and the head and fore legs the prominent features. The Greeks I imagine seized upon the hint and wrought it out into the many beautiful forms, for which many of the Egyptian would pass muster.

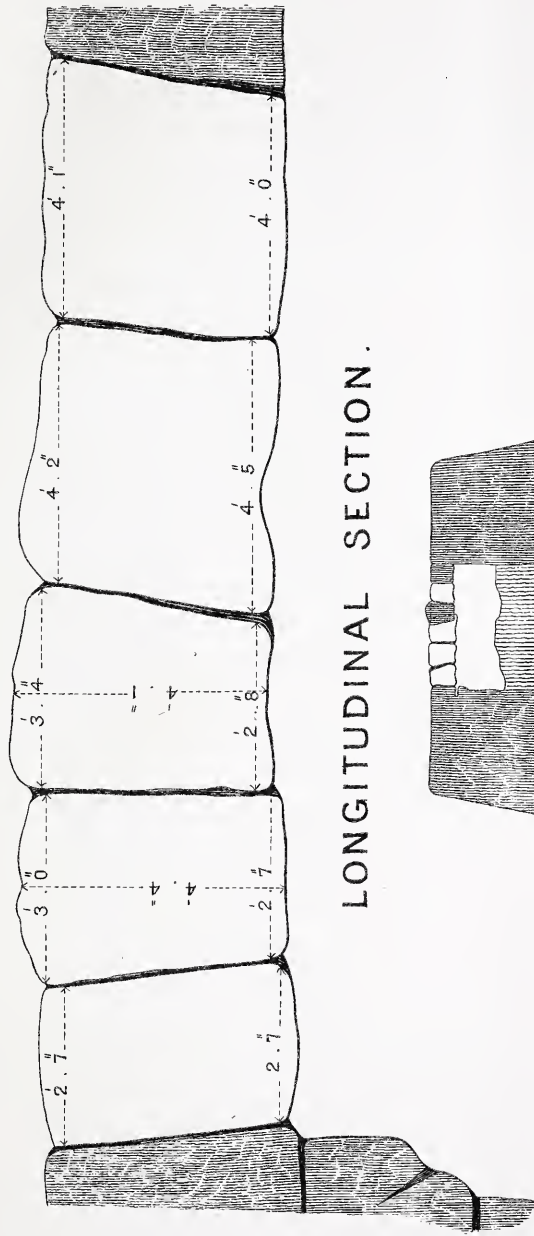
Before I leave the interesting work of the grand old Egyptians I should like to say a few words as to the treatment these are receiving from their descendants. I speak now of the Tombs at Beni Hassan, of immense interest alike to the architect and to every other man who can abstract his mind beyond the actual present. All the paintings now in nearly every tomb there have been defaced as high as the arm can reach by rude figures of men and boats cut into them. The injury appears to

COLUMN AT NAGA
NUBIA.



FROM LEPSIUS.

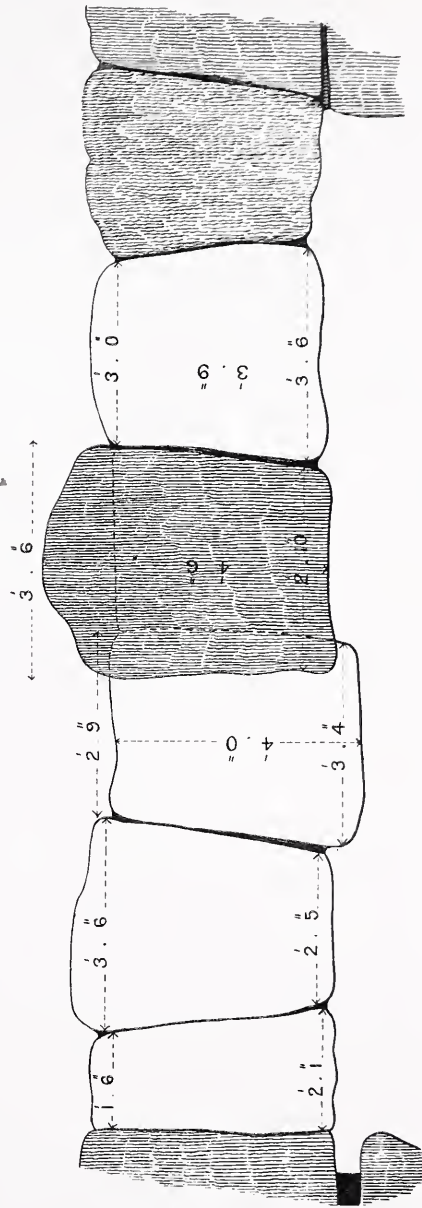
TRUNCATED PYRAMID AT GEEZEH.



LONGITUDINAL SECTION.



SMALL CROSS SECTION.



CROSS SECTION.

be recent (I could at least find it nowhere described or known), and has been done, I am told, by Arab boatmen. The figures are not painted or scribbled, but are deeply scratched in an inch or so wide, right through the surface of the delicate plaster, so that the injury is simply irreparable. And I may notice further here that I found in these tombs, as in a well-known place in Italy, that writing names on walls or sculptures is not a habit with which we English alone should be credited. Very many Italian and Greek names there were, some German and some French, but only one (be it English or American) that came from our race. I give it up to execration. It was Watson.

On the table are some specimens of mortar from the stonework immediately under the casing of the great pyramid. I have brought them, partly because it was stated some years back in this room by a distinguished antiquary, that the invention of mortar is due to the Romans, but mainly on account of its curious composition. I have compared it under a powerful microscope, with specimens of modern mortars and cements, on which I have been experimenting for some years, and find that it differs from every one of them. In the Egyptian there is no trace of sand or any equivalent for it except powdered gypsum and some red specks of minute fineness even under the microscope. These must be of ground pottery, as the Egyptians did not burn their bricks until the time of the Romans. This microscopic test confirms in a striking degree, the analysis of the mortar given in Cresy's *Encyclopædia*, which differs from any modern mortar or cement by the very small quantity of sand or clay there noted. The crystals of selenite also noted, are abundant in the specimens before you.

Next in date came probably, the Coptic churches of Fostat or Old Cairo. They were very well described in detail by the Rev. Greville Chester, in the *Archæological Journal*, 1872. So I give only a few memorandums to supplement his paper. In this he speaks of the difficulty of seeing them and the extreme jealousy of the priests. This was altered when I was there, and I not only found them perfectly civil, but they helped me in trying to rub or otherwise copy some of the beautiful details of the churches. But from what I have heard, things have again altered and for the worse. Anyhow, an attempt should be made by every Architectural traveller to see these churches, as they present objects of interest quite beyond all proportion to their small size. Many of them have the semi-circular apse with the stone or marble benches still round, of which a few examples only exist—as at Torcello. One of the churches is so very rude and has undergone so singular a transformation, that I must detain you a few minutes with its description. It is said to have been formerly the church of St. Michael, altered to a Jewish Synagogue. It is Basilican on plan and section, built up, just as the Roman were, with old columns, &c., but put together in a ruder manner than any Roman or other church which I remember. The altar end has a chancel screen and wall lining of some of the most beautiful Saracenic work. It may be taken I think for granted, that the Arabs would never have allowed one of their mosques to be turned into a Christian church, much less a Jewish one, and so we must believe that Saracenic workmen altered the original Basilica for the Christian or the Jew.

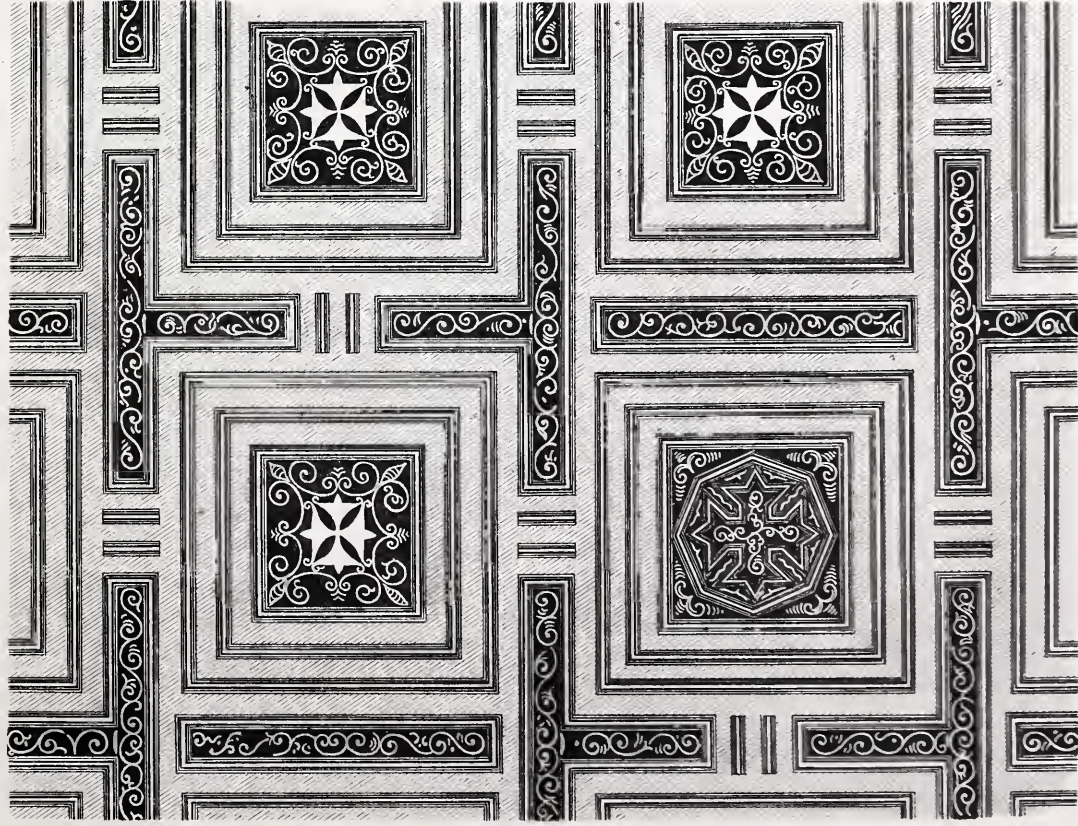
The most interesting part of these churches is however the details, such as the sacred vessels, crosses, lamps, pulpits and screens. Much of these was well described by Mr. Crace, in his paper read here in 1870. To his kindness I am indebted for some very beautiful illustrations now before you. Some of the screens are of exquisite workmanship. I made several attempts to obtain rubbings, but the projecting surfaces, though apparently even, are really not so, and thus the rubbings gave but a meagre skeleton of the work. Drawings from one of these which I could best copy, together with some of the rubbings themselves, give the effect, but I have not attempted to fill up the void spaces with the extremely delicate work with which every panel is filled. The general mass is of dark wood lined in with ivory, all mitred and joined with almost inconceivable care, just as I have seen the work of the Arabs in other countries from Palermo to Algiers, the

beauty of its execution rivalling that of its design, for nearly every example is perfect, or nearly so, after many a century of decay. The elaborate carving of the panels was made, I was informed, of ivory, softened in some forgotten way, and then stamped or moulded and coloured. I give no particular opinion as to this, but I doubt it. My drawing shews, as a contrast with this, some of the genuine work of the Arabs from Mosque Teyloun, A.D. 876. It is strikingly like that of the Coptic screens. The pulpits and the walls of some of the sanctuaries are enriched with mosaics of marble and mother of pearl. This is peculiar, but there are fine examples of it in Saracenic work of the best period and (I am told) at St. Vitale at Ravenna. If so, it escaped my notice when there. In these churches are some curious monograms—of unusual forms—probably owing to some of the words contracted having been Coptic. The names to the three first in my drawing were written for me, under each, by the priests, who were all eager to interpret them to me, and all agreed in their meaning. The irregularities of the cross and its monograms were copied by me as accurately as I could manage. One other peculiarity of these curious churches I must notice is the roofs. They have a striking resemblance, except in their lower pitch, to the 13th century French roofs which Monsieur Viollet-le-Duc describes, and are formed with queen trusses, the queens being in two halves, enclosing the tie beam, and forming a graceful pendant below, whilst the principals run right up to the ridge in place of being cut off at the collar as in modern roofs. I believe that in this, as in many other parts of 13th century work, the old plan was the better. As to the date of these Coptic churches, nothing definite is, I think known, but a passage on which I happen to light in the Revd. S. C. Malan's translation of Al Makrizi seems to throw some little light upon it. He describes a terrible outbreak of fanatacism in 1002, when the mob pulled down churches and synagogues alike, and 3000 were destroyed in Egypt and Syria. In his history of the Memloulk Sultans he says that another took place in 1300, when an order to pull down all the churches was issued, and the demolition began. But at the outcry of the Christians and Jews at Cairo the order was suspended until the question could be decided by the Kadis. Their decision was that any church or synagogue built since Ismalism should be pulled down and that the more ancient should remain. I have not seen this statement noticed, but it seems to me to establish to some extent, the probable date of these very curious structures as being in most cases, between 1002 and 1300; for if the date of any one could be carried back so far as 300 years it could, doubtless, be easily stretched out somewhat farther. I give a curious mason's mark which I saw on one of the old columns of the Mosque of Amron, now partly destroyed. It was on the underbed of the column and so concealed. This unusual position suggests the idea of a Christian mason working for the Mahommedans and putting his sacred emblem where it was safe from view.

I now come to the Saracens. I will not detain you with any general description of Cairo. Its picturesque, tortuous and crowded streets and alleys, its splendour, and its beauty, even in its decay, are well-known to you all. More shown than ever now, when new broad streets cutting through house and Mosque, bring out to the face of day, the beauty and the wretchedness (for they often go hand in hand) otherwise concealed. All this was known to me as to you long before Egypt was to me a living thing, and I have wondered how the Saracens, a nation to whom science and art alike, owe a debt not quite I think acknowledged, could thus have founded this great city El Kaherah, the Victorious, the great capital of their Empire. After seeing it I venture to say that Cairo as it is, no more represents the nation who founded it than the Arab of the present day represents his fierce artistic forefather.

The most ancient part was the Roman fortress of Babylon, in part still existing, and containing several Coptic churches. El Fostat (now old Cairo), containing other Coptic churches, was founded by the Arabs, c. 640. The next important part, El Katyë containing the Mosque Teyloun in 869.

PORTIONS OF WOODEN SCREEN FROM THE
COPTIC CHURCH OF ABOO SEPHEEN.



THE THIN LINES ONLY ARE IN IVORY



But the part which we best know was founded c. 970, and partly reconstructed in the time of Saladin, who built the stone walls and old citadel c. 1180, about the time when the Normans had well nigh ceased work in England, in their peculiar style, and roughly that of Norman dominion in Sicily is 1060 to 1194. And I venture to say that the city was laid out with as great care and on as regular a plan as any city of its own time, except perhaps of Edward's Bastide Towns, however intricate and crowded are the streets and alleys of Cairo now. The proofs are to be found, in every quarter of the city, clearly indicated by the stone fronts all built in the same style, and on a uniform (too uniform) design. The fronts are arched, and have wide openings for shops. The difference between the several designs consists simply in one being more elaborate than another. Otherwise, mouldings, ornaments, and details are alike, with a most singular mixture of Norman and debased classic, often so rudely carved that it is difficult to sketch them accurately. I give some examples, from sketches kindly lent me by Mr. Vulliamy. The doorways are often finished with hood mouldings (as are also many of the doors to the mosques), and many have the Norman zig-zag ornament in profusion.

One of the most curious instances of the mixture of styles is that of Norman details with those peculiar to the Arabs in the fine building, Gama ez Zahir on the road to Heliopolis, of which I give some sketches of my own and a very artistic one lent to me by Mr. Spiers. There we have Norman zig-zags and mouldings which we should recognize anywhere as Norman combined with the most decided and delicate Saracenic. It reminds one of Sicily, where Arab workmen laboured under Christian architects, and both styles are thus mixed. At Cairo probably the conditions were reversed. But there is a curious fact which struck me as I watched the modern Arabic work in Cairo, viz. that the stonework, as sawn, gives just the same appearance, in a rough way, as the delicate tooling anglewise which we know so well in Norman work, whilst the tool still used is the old claw tooth which gives the well-known thirteenth century toolmarks, and which so surprised M. Ganneau in his Palestine Exploration reports on mediæval masonry there.

I have made these few notes as to Norman features because I have not seen them mentioned even in such books as Sir Gardner Wilkinson's, or in Mr. Lane's and Mrs. Poole's, on the modern Egyptians—some of the most admirable and yet unpretending books that I know. Above the stonework which I have described, all was, no doubt, of wood, the upper stories projecting over and carried on large stone or wooden corbels. The elaborate carving to the windows serving to secure privacy in the narrow alleys, has been so well described by Mr. Crace in his lecture here in January, 1870, that I need not allude to them. In the interior of the houses, probably better examples (or at least more accessible) exist at Algiers than at Cairo.

The chief features of Cairo are, however, the mosques so often described, especially in M. Costes' great work, that I will only say that notwithstanding a tolerable acquaintance by description and drawings of the work at Cairo, I was utterly unprepared for the exquisite beauty of much of it. Particularly I may mention the bronze work to the great door of the Mosque Kaid Bey, 1496 (strangely overlooked by M. Coste in his drawings of the Mosque), and which equals any work of the kind that I have ever seen of mediæval date. Some of the wood and mosaic work is exquisite beyond description. To take one instance, at Abou Nasr, the wall lining is of mosaic, outlined with mother-of-pearl, and the marble floor bordered with mosaics of intricate patterns, of which the black and white are of marble and the red, yellow and blue enamelled. A great deal of artistic skill was also exercised on many of the open-timbered roofs, reminding me of the noted one which I drew years back at Messina, and to which Mr. Pullan alluded in his last lecture.

One of the best examples of Cairo is at the above-named mosque, Kaid Bey, and as this was

being repaired, and the old woodwork on the ground, I could see exactly how it was done. In some of the commoner parts the painting was directly on the wood; but the more ornamental had canvas glued all over them, a coat of very fine plaster, just as at Messina, being laid over all to receive the painting and gilding; much the kind of foundation, in fact, that one sees in mediæval work; the retabulum, for instance, at Westminster Abbey, except that in the latter there is, I believe, no canvass. At Kaid Bey much of the more prominent ornamental parts are raised in strong relief, thus giving a more brilliant effect than any mere surface decoration could give. Possibly this raised work might have suggested the gorgeous coloured mosaics in relief in the renaissance churches of Palermo, a kind of decoration peculiar, so far as I know, to them.

Another example of Saracenic work was new to me, and not even mentioned in the usually accurate Murray. I mean the illuminated MSS. They are in the Government school library, in which I had complete liberty of investigation, through the kindness of the minister. The most interesting of the MSS. are of large size, many of them being about 36 in. \times 22 in., and written, I was told, on silk paper. It is very thick, beautifully soft and even in texture, but in spite of repeated inquiries, both in Egypt and England, I can learn no particulars as to its origin and make. Dr. Riou has kindly shown me some examples in the British Museum, beginning from the end of the 13th century down to the end of the 15th. The earliest MS. at Cairo dates from A.D. 729, and is well written but not illuminated. The most remarkable of the others bear date in the time of the Sultan Caaban (Shaban), 1363-77: Beguny (Berkóok) 1382-99, and Manyzed (Moauid), 1412-21. (I take the dates and the spelling from those in the library). They come down to the present time, one having recently been written at Constantinople for the Viceroy. Some few pages at the beginning of each volume had richly illuminated margins, and there were also small illuminations in the margins all the way through.

The librarians were very courteous; and being very interested at *my* being interested, opened all the chief MSS. at my request, in a row side by side on a very long table, and arranged them chronologically, so that I had a capital opportunity of comparing them. They are, on the whole, far superior to any Arabic illuminated MSS. in our Museum, and I need scarcely say that those illuminations of the 14th century (the time of the Grand Mosque Hassan) are decidedly the best, and those of the present time as decidedly the worst. In fact, there is a clear deterioration from the 14th century downwards. Except the most recent, they are all designed in delicate Saracenic diaper patterns, much in the style of the beautiful work at Mosque Teyloun (876). In the earlier ones, all the colours, except a few bright spots, are neutral in tone and outlined in gold. Generally they have a ground of dark blue, and on this the diapers are worked in the most exquisitely harmonized or contrasted tones of light blue, light green, red, and a little white. As we come to the later MSS. the neutral tints are gradually exchanged for vivid, positive colours, and many of the diapers are outlined in white. In all the MSS. there is a good deal of gold, especially in the initials. But I was surprised to find it decidedly inferior to that in our own Mediæval MSS., and not having the beautiful, solid, metallic look, which the latter have.

I have said that the new work is inferior to the old, the decay being clearly shewn by the delicately designed and coloured diaper, and other intricate work of the 14th and 15th century being supplanted (as shewn most distinctly in the latest of all), by scroll-work coarsely designed and executed, with ill-drawn curves and all gaudily coloured. It is the same with all other phases of Arabic art, and as striking examples, the exquisite carvings on the earlier tombs, are now supplanted by wretchedly sculptured sprawling scrolls; and so low indeed has art fallen, that some of the chief ornaments in the State Tombs of the Viceroy's familys seem to be copies of glass chandeliers, surrounded by these horrible scrolls.

As to the general architectural work of the present time, one can say nothing by way of praise. Of course, in the vigorous efforts at improvement which one meets with in every part of the Viceroy's dominions known to me, it is natural to expect that European art will follow European customs; and thus one actually meets at Cairo and Alexandria, Suez and Rhoda—in the palaces, houses, factory and shop alike, specimens of art as unlike those of the native Arab as can be conceived. So completely in fact, is his art extinct, that he is unable, so far as I can learn, even to imitate the beautiful work of his forefathers, so far as to repair it. Certain it is that when any of the beautiful Mosaic work decays, it is replaced (when replaced at all) by plain slabs of marble, and even the restoration, as it is called, of the lovely ceiling over the Tomb of Kaid bey is so vilely done, as to show the very power to appreciate the old work is gone. The picturesque bay windows, so charming a feature of the old houses, are now supplanted by others utterly different, with one side turned angle-ways to the north, where possible, and of a form which is simply hideous. Fancy the effect of a row of these things on each side of a wide hot street, as may be seen in many a new one in Cairo now. I apprehend that the decay of Arab art in Egypt, as in every other Mohammedan country, dates with the decay of its power. It was in 1517 that Egypt was conquered by the Turkish Sultan Selim, and no public work of any great value, so far as I know, has been done since the erection of the Tomb of the last of the Sultans (El Ghorce) who was killed in that year in resisting him. Not only is Arab art to a large extent extinct, but the best works of its best days are perishing. The earliest of all, Mosque Amrou, is partly pulled down, and the rest going to decay. The next Mosque in date, Teyloun (c. 876) which exhibits some of the most beautiful of the Saracenic details is disused except as a refuge, a sort of village, for the most destitute of the families near. The same neglect is seen even in the grandest mosque of all, and still in use—Hassan.

As one passes through the great cemeteries this neglect seems doubly sad, for were they tended with the same loving care with which the graves of those who have passed away from us are tended by ourselves, I believe that nothing on the face of the earth could well exceed them, either in the devotional feelings to which they witness, or in the picturesque beauty of each and all. The Mohammedan tomb is, in fact, well nigh the realization of what we feel most deeply. First the chapel, beyond it and through it, the grave. A minaret marks the chapel, a dome covers the tomb. Imagine a host of their elegant forms, standing up as they do, in many a Mohammedan cemetery elsewhere, sheltered by the foliage of the palm, the cypress, and acacia as a contrast to their grey stone. But there is none of this at Cairo. The minarets and domes rise above ruined walls, bare and desolate, whilst the horse and the camel, the carriage and the cart pass, as they will, between and sometimes over the graves. My own horse's hoof crashed through the arched covering of a grave, in one of the best used cemeteries, and no one seemed to notice it or care.

A few words, now as to the modern houses of the living. My journey was at the time of the highest Nile known for many years, and so I had good means of seeing exactly the formation of the great mounds, which mark the site of many a town in Egypt. The houses are built of sun-dried bricks, liable of course to be softened by water, &c. Long before the inundation itself reaches them, the ground becomes saturated and moistened by capillary attraction. The lower courses of bricks thus become gradually soft, and unable at length to bear the weight of the walls and roofs, and then the whole structure crushes down to be resolved into its primitive mud, and to become the base of another house at a higher level. One house crushed down as I passed, and the one in which I was staying, a very large and substantial looking one, two stories high, was expected to fall in two or three days.

In building, ladders are superseded by long inclined planes up which everything is pulled, rolled

or carried. The mortar is carried up in little vessels about the size of a pie dish on the heads of girls or boys, who march up and down in little processions, moving in cadence to a wild chant which the leader starts, the others joining in a chorus. My friend Mr. Dixon interpreted for me one of these little chants, which was simply this "O Abraham, light of my eyes, O Abraham."

I may, perhaps, now be allowed in conclusion, to say a few words as to some facts which have struck me, as much from what I have read as from what I have seen as to Egyptian architecture generally. First is the vast influence which the customs and manners of a nation exercise over its architecture, and one feels how little in comparison is that exercised over it by the climate or the materials however ready to hand.

First comes the native Egyptian. He built temples of immense size, and with stones so enormous as to have furnished the text for a well-known discourse from one of our first living Engineers, and in lower Egypt disdained the limestone which was ready to his hand, and sent hundreds of miles up the Nile for the granite wherewith to build his cities in the Delta—and he buried his dead in the caves of the rock which he carved and decorated as none others ever were before or since.

Then came the Christian and the Arab. In place of the massive Pylon and gigantic colonnades there arose the tapering minaret and the lightly vaulted arcade; and the gloomy pyramid and cave of the Egyptian were replaced by the graceful tomb-chamber with its light and elegant dome. So utterly different were the two styles in the same country, with the same materials, and with the same native population for its workers.

Then as to Egyptian art *per se*—an interesting study because, unquestionably, it is the earliest we have; and at first, as one sees the grand results of its columnar architecture, we think that it must be far advanced. But consider it in detail. The massive columns support no cornice. Simply on them are laid great blocks, and in place of the beautiful mouldings which have been the life of every style since, we have merely the hollow and round common to every style in every time. To the Egyptian, the dignity of the cornice was unknown. The base was equally unknown. From the earliest to the latest time of art in Egypt, nothing beyond a square plinth so far as I know, was ever used. Then the capital was not invested with the dignity given to it by the Greeks and the Gothic architects. Studiously did the Egyptian show that the projection of the massive capital bore no weight, for he placed above it a block no larger than the shaft itself, and in this block the whole weight of the beam above was borne. And the shaft itself, in place of coming down solidly on the plinth was, almost invariably, rounded off inwards, so that it might have been, so far as strength goes, little more than one half its size. You may easily see this from the drawings lent by Professor Donaldson and Mr. Spiers, and a column in the British Museum, where the area at its base is less than two-thirds that of the part above where the contraction begins. It is no doubt, to some extent true, that, theoretically, the strength of a column is not increased by any spreading at the base, and that its strength is only that of its smallest diameter anywhere. But there can be no doubt, that the pressure at the base is diminished just in proportion as the area there is increased, and that the stability of the column is directly proportioned to the spread of its base; and whether the fearful destruction of the temples at Thebes and elsewhere, be due to the tremendous earthquake of B. C. 27 or, as modern Egyptologists believe, to the wearing away of the base by the infiltration of the Nile waters which are saturated with nitre and thus eat into the stone, there can be little doubt that had the columns expanded as do those of every other country, those magnificent groups might have been standing now.

Finally, I must call your attention to one more subject as I did when I gave my Notes on Algiers. In every age, from the earliest time of Egyptian art to the latest of Pointed architecture, each separate

nation worked out for itself, whether on the basis of other styles or not, its own separate style, with its own outlines and decoration, and kept to it well-nigh to the exclusion of all others. So much so was this the case, that although the Romans derived their art mainly from Greece and employed architects of all countries to work it out, they so thoroughly stamped the Roman mark upon it that even at Athens, you can tell the temple or the arch of the Roman, from the work of his tutor, the Greek. The value of this distinction to the architect, antiquary and historian, can scarcely be overrated. But this will scarcely apply to Egypt. There are, indeed, I am told, some few examples in the Fyoun, Nubia, and other oases which are truly Roman in style. But all the grander works, both of the Greeks and Romans, are so completely Egyptian in outline, mouldings and decoration—so utterly unlike anything which we recognise as Greek or Roman, that it requires a most practised eye to discover where the Egyptian had left off and his successor began. But no one, I think, who has noted the grandeur, calm and majestic, of these old Egyptian works, will wonder at the spell which they seem to have cast even over the Greek and the Roman.

THE PRESIDENT.—I hope there are many gentlemen here who have travelled in Egypt, who will follow up this interesting Paper of Professor Lewis, with some remarks. Perhaps Mr. Whichcord will favour us with some observations on the subject.

MR. J. WHICHCORD, Vice-President.—My visit to Egypt is so remote, that I hesitate to follow Professor Lewis in the able Paper he has read to us to-night, and to which I have listened with much pleasure. I have felt great interest in the peculiar features of the illuminated manuscripts which he has described. I had no opportunity during my somewhat lengthened visit, now thirty years ago, of seeing anything of that kind in Egypt itself, but I have seen similar manuscripts in Damascus and other Syrian cities. I recollect some fine examples which were shown me at Mount Carmel. The monks of that monastery have one of the finest collections of Oriental manuscripts extant, and as far as my recollection serves me, the particular mode of illumination to which Professor Lewis has alluded, was not apparent upon those. I think the Carmelite Manuscripts may have been of later date than those he has alluded to. I do not venture to trouble the Meeting, at any length, with my distant recollections of Egypt, and its glorious antiquities. Professor Lewis brings us down however to a more recent description of modern Cairo, than the date of my visit; I think I may take it at that period the city was far more picturesque than it is at the present moment, and in the modern houses the polychromatic decorations, Saracenic in character, which were formerly common, no longer form a prominent feature. No polychromy I have ever seen had more brilliant colours. The red was more like a surface of sealing wax, and the effect was very brilliant. Another thing which I remember, struck me, was the workmanship of the joinery, especially marked in ornamental ceilings and windows. The joiner's work, generally speaking, was executed in a white soft wood—if not precisely the same as our deal, very analogous to it, and was always manufactured in exceedingly small panels to avoid the shrinkage which would otherwise arise from the heat of the climate. I believe a great deal of the precision and durability of the work is due to the fact of its being framed in such small pieces of stuff. The elaborate wooden surfaces of the ceilings of the principal apartments in a Cairo house of the period, afford numberless examples, as well as the screens or lattices to the windows. Glass, you are aware, is but sparingly used in Egypt—only in exposed situations, and rarely in the interior courts of the houses: but, though generally thought flimsy, the work of the joiners in Egypt at the time I am speaking of, was exceptionally good. I do not know that anything else occurs to me at the moment, except as to the country houses to which our friend has directed attention, and the sun-burnt bricks and *debris* of old houses forming the foundations of new ones at a higher level. I recollect paying a visit to a

village, some three day's journey from Cairo, in which I examined such a house. It was in comparatively cold weather, and afforded a curious illustration of how the inhabitants get warmth. The house which was built of sun-dried bricks and mud, was very much like a flat brick-kiln, and had only two apartments, in one of which was the oven arched over, the arch forming the roof of the house; a small fire was lighted underneath, which gave the top surface a considerable amount of heat, and on it the whole family reposed unclothed during the night. This is a fair illustration of the primitive condition in which the inhabitants of Egypt were housed in the country districts in 1845, and I gather from Professor Lewis's remarks, they are not yet much better off, although the aspect of modern Cairo may have assumed the features of Paris and Brussels.

Mr. J. D. CRACE, Contributing Visitor (responding to the President's invitation) said,—I have listened to the Paper with great interest, and I think it almost superfluous to supplement it by any remarks. Professor Lewis has travelled over a great deal of ground, and he has mentioned many things relative to some of which I will very briefly mention my own impression. First, as to the probable route of the Israelites in the crossing of the Red Sea. There is one feature with regard to that, which is not generally known, and which was only brought to light during the progress of the excavation for the Suez Canal, when it was discovered that there were strata of salt lying in considerable depths, varying from 12 inches to 12 feet in thickness, extending as far or even further than the Betta Lakes, from the Red Sea. Evidently, the Red Sea has extended inland in the direction of the Mediterranean, at least, as far as the Betta Lakes, and probably further, and that at different times, so that the bed of salt was again covered with the desert sand and rock, and then again the sea advanced and further evaporation and crystallisation of the salt took place; and this would appear to have been repeated at least, three or four different times. That is an interesting fact which was apparent to me, when riding through the whole length of the canal from the Red Sea to Ismailia. Another point is, that in tracing the different epochs of Egypt, Professor Lewis did not allude to any distinctly Roman or Byzantine work, and I believe no building of the kind exists so low down as Cairo. But there are some interesting remains at "Ibreen" (which is on the Upper Nile, between the first and second cataracts) of a small Roman city of the later empire, probably dating from the 4th or 5th century. There is a basilica, with the walls standing, including those of a square tower or campanile, which remain to a considerable height, and one of the columns of the interior was also standing in its original position, but the interior of the space has been utilised as a mosque by later Arab builders, who retained the old walls and entirely remodelled the interior with Arabic pointed arches, &c. This building supplies a link between the Greek Egyptian art and the later Coptic art. Passing over some other interesting points, Professor Lewis alluded to some work at Kaid-Bey, where, besides the beautiful decorations, there are bronze doors of an extremely elaborate description. In the mosque of Sultan Hassan, are doors still more elaborate, with the bosses inlaid with delicate niello work in silver. I believe these have been illustrated, but I cannot call to mind by what author: I think in a French work. With regard to the illuminated books, Professor Lewis mentioned the great difference in the method of using gold in the Arabic and European Manuscripts. The gold in the European MSS. was usually laid on very thick *gesso*, or "preparation," and as far as I have observed in the Arabic works, it is almost entirely laid on the vellum itself, or upon the coloured ground, and does not obtain the same solidity, nor is it capable of the same burnish. That is a technical matter which may explain the difference of effect. Perhaps, some of the most interesting of the more modern building works in Egypt, are those which are found higher up the country than Cairo, in some of the provincial towns, 100 or 300 miles further south. These contain some interesting specimens of brickwork in different colours, and in other cases the material is cut out of the native dark stone, some black and white, and some red and white

bricks. In some instances, there are curious bond timbers visible on the surface, and these are carved on the outside. These structures are quite worthy of illustration by future travellers. I believe there are few countries which will better repay the architects' visit than Egypt, and as Professor Lewis has alluded to the Palestine Exploration, I venture to appeal to him to extend his travels in that direction. The architectural and archæological knowledge which he could bring to bear there, would be invaluable in connection with the interesting work now being carried on by the Palestine Exploration Fund.

Mr. R. PHÈNÉ SPIERS, Associate.—Perhaps, I may be allowed first, to preface my remarks by proposing a very hearty vote of thanks to Professor Lewis for his paper, and then to say I am going to be rash enough to question the drawing which Professor Lewis made of the Egyptian capital. Professor Lewis pointed out that the Egyptians did away with the use of the bell-shaped capital when they put between it and the architrave a square block of stone; but I would point out that at all events, the block being square and each face equal to the diameter of the column, there are four corners under this block which would have been unsupported if the bell-shaped capital had not intervened. I agree with Professor Lewis, that not so much use is made of the capital as might be, and in later times when the Arabs have made use of the old Egyptian capitals, in their mosques they have in general turned them to better account, and supported portions of the springings of their arches on projecting portions of the bell. In reference to the remarks made on modern work, I was struck by the extraordinary resemblance between the modern houses of the Egyptians and the ancient pylons. When travelling on the Nile, we were always looking out for ancient remains, and were constantly disappointed by finding that what we had supposed to be some ancient Egyptian town was a modern one with pigeon houses resembling pylons. In the southern portion of Egypt the houses described are always built of mud, and the walls decrease in thickness as they rise, in consequence of their being built with unburnt bricks (in fact, there is every reason to suppose that the raking walls of the Egyptian pylon were copied from prototypes in unburnt bricks, and that these latter were not unusual is proved from the existence of many of the great central doorways of these pylons, which having been built in stone, now remain still erect in their isolated grandeur. The lower portion is occupied as a residence, and the walls are carried up and form small towers as it were, which are inhabited by pigeons, and these have a striking resemblance to the pylon of ancient days.

There can be no doubt that the system described by Professor Lewis, of carrying the materials up an incline, was the system of building the pyramids and all the great buildings, and they perform the work in the same way at the present day. When I was in Egypt, they were making the railway from Cairo to Thebes, and relays of workmen worked in the same manner as represented in the drawings in the ancient tombs; they carried the materials for the railway in little baskets, and occasionally in an old English hat,—refusing to use the barrows and other larger vehicles provided—and it is only by employing an immense number of labourers that the work is finished. We have all greatly to deplore the destruction which is now taking place in all parts of Cairo. The general system of the destruction is this:—A mosque menaces ruin in some parts; perhaps a minaret is in danger of falling, and a stone tumbling down kills either some great or some small person, in consequence of which the Government decide that as much of it that is dangerous shall forthwith be taken down. The materials are thrown into the road, and carriages have to find their way through as best they can. The inhabitants take away the stones one by one, and at last the street is cleared. Then another portion menaces ruin and is taken down in the same way, so that throughout Cairo buildings are half pulled down or half destroyed; they will not restore their buildings in any way, and will not allow anybody else to do so. With regard to the modern work in Egypt, it is the most detestable that can

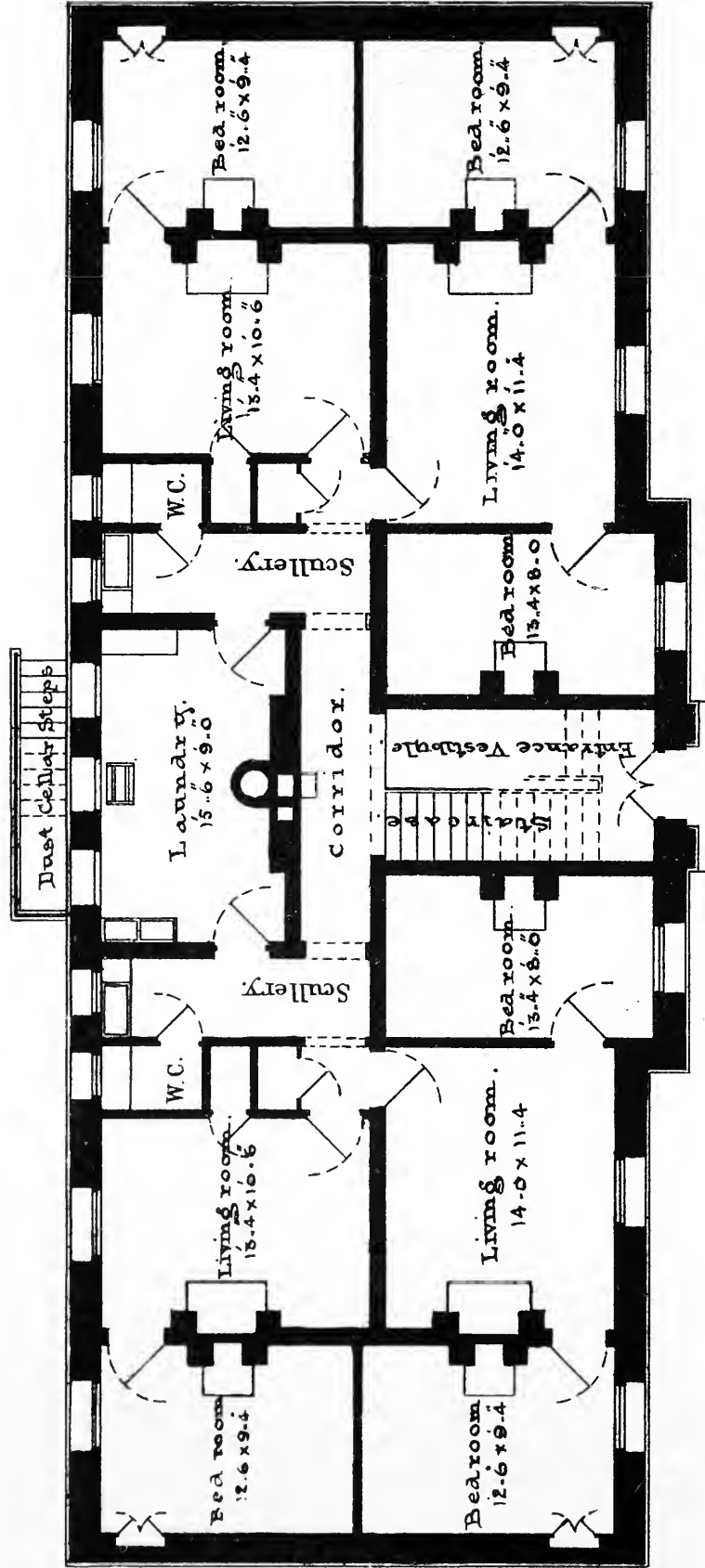
be imagined, and the architects, chiefly Italians, I believe, are allowed to execute the most frightful designs. One building known is worthy of mention, viz.—The Mosque of Mehemet Ali, the design for which was based on one of the finest mosques of Constantinople ; so that it was impossible to go far wrong ; but even there it is a pity to see the magnificent materials of which it is composed falling to pieces, and large slabs of alabaster falling out from insufficient workmanship. There exists a work by Jules Bourgoïn, published by Morel, of Paris, within the last five or six years, which contains accurate drawings of the mosques and details of old Cairo, so that if they are destroyed partly, there will remain some record of their original splendour.

Mr. W. H. WHITE, Fellow.—In seconding the vote of thanks to the learned author of this most interesting Paper, I wish to make a few remarks, which I am afraid will savour more of the things of this world, than of those of the pre-archæological periods of which we have just heard. It was the custom of our fathers to earn their citizenship of the world by a visit to Cairo, and to describe it as the most Oriental of cities ; but now-a-days Cairo only appears Oriental to those who have never been east of Bombay. I rejoice to remember that on entering the city by the Suez Railway, the ruin of the pyramids is cut vertically by a factory chimney shaft, quite as ugly as any Londoner can conceive. The city itself is full of houses with fronts of limestone, and many storeys high. There are new boulevards under the very foundation of the great mosque of Mehemet Ali. Indeed, there is a touch of *expropriation* about the place, reminding you of Paris,—and that touch is dear to architects—and particularly dear after having passed through an Egyptian custom house, where the hand of appropriation is severely felt ; but the Mahomedan architecture of Cairo cannot be compared to the same architecture in North-Western India. It is like electro-plate to solid silver. The brilliant red sand-stone, the variegated marbles which dazzle you in Delhi and Agra, and sometimes in Benares, the delicate ornaments which astonish you in Ahmedabad, are represented in Cairo by so much paint and plaster. And although I remember at our last meeting, some members present seemed disposed to give up their cherished opposition to stucco, still I cannot suppose they are prepared to-night to swallow paint. However, I rose for a more practical purpose than recrimination. I wish to offer a suggestion to our Hon. Secretary for Foreign Correspondence, and I hope to do so with becoming humility. I would suggest that this Institute, without relaxing for one moment its extended grasp over Russia and Mexico, should enter into lively relations with some, if not all, of our brethren in Cairo and its neighbourhood, and also with some of those who practise a kindred profession ; so that, when the time comes—and it is not far distant—there may have been laid the foundation of an artistic intercourse which may be quite as beneficial to both Egyptians and Englishmen, as that political intercourse which is inevitable in the no remote future of Egyptian independence.

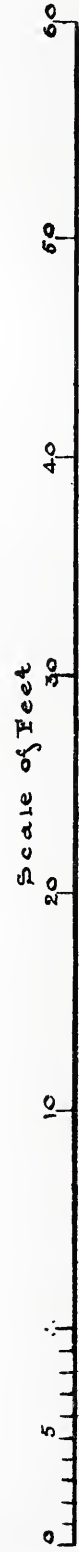
THE PRESIDENT.—It is needless, I am sure, to put the vote to this assembly, and not having travelled in the East, I will not trouble this meeting with any remarks of my own, but I will take the liberty of expressing to Professor Lewis, the extreme enjoyment I have felt at every part of his lecture, and must have been felt by every one here present.

The vote of thanks having been carried by acclamation, the discussion was brought to a close and the Meeting adjourned.

PEABODY MODEL DWELLINGS, ERECTED AT PIMLICO.



GROUND PLAN.



Royal Institute of British Architects.

At the Ordinary General Meeting of the Institute, held on Monday, the 13th of December, 1875,
Sir GILBERT SCOTT, R.A., President, in the Chair, the following Papers were read:—

ON DWELLINGS FOR THE POOR.

By H. A. DARBISHIRE, Fellow.

MR. PRESIDENT AND GENTLEMEN,

It is with some reluctance that I venture to trespass upon your time this evening, and to submit the following short account of my own observations relating to the Dwellings of the Poor to your kind attention; for I feel that the little which I have to offer may fail to prove either very interesting or very new. My apology rests entirely upon the hope that others, whose opportunities have been greater and more varied, may be induced to add the results of their experiences also, and to increase our present limited knowledge of a subject which is assuming an aspect of daily increasing importance.

It might reasonably be supposed, that to provide dwellings on a humble scale were no very difficult task, or one requiring much more than common sense for its accomplishment; and it might be assumed, that as the poor are generally nearly as badly housed as they well can be, no attempt to improve their condition in this respect could possibly fail in making it better. Those, however, who have been much engaged in endeavouring to effect this improvement, will confess that the task is a difficult one, and beset with perplexities at the very outset. One of these is, how best to determine the nature and extent of the proposed improvement, so that the funds, which are necessary for its execution, may be applied in the best manner and secure the greatest benefit, with the least waste; but before this can be done, something definite should be known about those who are to be benefited. It does not quite answer the purpose to admit that the working classes want dwellings, and that if dwellings are built for them their wants will be supplied. The great working class, as a whole, is not a homogeneous mass of human beings, without idiosyncrasy or personal identity, whose positions, habits, ways of living, and ideas of comfort and discomfort, are the same. It consists, on the contrary, of a great number of sections, which differ from each other as much as those that compose the upper stratum of society, and therefore it is a mistake to suppose that buildings with uniform arrangement and few varieties of accommodation, however excellent these may be, will meet the requirements of the whole class. Each section needs its own kind of dwelling: how to build this on the best plan; how to confine its accommodation within suitable limits; how to economize its construction, so that its maintenance and management may make the fewest calls upon revenue; and how to provide for domestic necessities and home comforts, involving extra outlay but yielding no additional profit, so that its independence and self-supporting character may be properly maintained, are lessons which time, patience, and close observation alone can teach, but which, if unlearnt, no general plan of improvement can be made really serviceable to the poor themselves, or encouraging to those who are engaged in their behalf.

There are, however, two descriptions of poor, those who work and those who do not. The first alone compose the working class. They receive regular wages for regular work ; and this makes the great distinction between the two. Costermongers, sempstresses, and a few others deserve to be included, because, though their employment and earnings may be frequently uncertain, their work would be constant if they could make it so, and they follow a vocation as an ostensible means of living. But those who have no regular occupation and no settled dwelling—whose earnings are dependent upon the season of the year—whose habits lead them from the tavern to the police courts in times of prosperity, and to the workhouse when the days are evil—who wander from place to place like vagabonds, as they are, neither seeking nor caring for the shelter of a decent home, these are but pariahs on the outskirts of the working man's fields of labour, with whom he has nothing in common, and with whom he ought not to be associated.

The distinction which wages creates is sufficiently important to justify its acceptance as a standard by which to divide the industrious poor into sections, for our present purpose.

As the requirements of each section are, to a great extent, determined by its wages, if these are known and classified according to certain limits, the degree of help which will be most beneficial to the interests of each section can be ascertained with tolerable certainty, and the welfare of the whole class may be advanced with prospects of success ; but after any one section has been chosen to receive the help it needs, the energies, which are necessary to promote its interests to the utmost, should not be dissipated in attempting to carry out utopian ideas of comfort or convenience, which are unsuited to its demands and interfere with the faithful observance of any predetermined course of action, which has been already proved reliable and trustworthy.

No attempt should be made to mix up the interests of one section with another, nor should the hope be entertained, that friendly intercourse will be encouraged between various sections by providing different classes of dwellings or accommodation in the same building, or groups of buildings, intended for their use. Experiments have been made with this view, and opportunities have been given to the lower sections to associate more frequently with the upper, in the expectation that their manners and habits would become softened and improved under better influence. Shops have been provided as part of the buildings in thoroughfares where they were most likely to answer ; work rooms have been added to the tenements of those engaged on piece work at home ; reading rooms and libraries have been supplied and furnished for the use of the better educated, and co-operative clubs have been supported to help the more provident ; but none of these have answered. Their failure may, in great measure, be attributed to the existence of strong class prejudices, which are widely diffused through all the sections of the poor, and which are very difficult to grapple with and remove. Those who consider that their wages entitle them to a superiority, which their poorer fellow-workers cannot claim, will not compromise their dignity by any condescension towards familiarity, and hold themselves aloof from them as if they were socially inferior ; and these in their turn, though they may resent this exclusiveness, acknowledge their disadvantage, and do not care to leave the retirement which shelters their poverty, and saves it from exposure to neighbours who would grant it no pity. Very frequently they prefer to remain, comparatively hidden, in out-of-the-way courts and alleys, than to incur the risk of exposing their mean clothing and general wretchedness in open thoroughfares, where they might have better accommodation at the same rent. Neither is it desirable to transfer the dwellings which have been occupied by a higher section to one that is lower, or to disregard the wants of one section in favour of another, under the assumption that if the upper section is benefited, the lower, necessarily, shares in the advantage. If tenements are forsaken as unfit dwelling places for one section, the probability is, that they may be equally unfit for another, and are not to be recommended, merely because their rooms

happen to be larger or more spacious. Large rooms and unmanageable space are not always desirable, and are often inconvenient, as will be shown hereafter. Any compromise with present difficulties tends so much to increase future trouble, that good intentions, instigated by the belief that *any* alteration of old, or *any* provision of new tenements will answer the purpose, must expect to be disappointed, and ought not to calculate upon anything but a very second rate reward for very unsatisfactory work. It is true that no good can be so absolutely wasted as to fail in reaching some who will be thankful for its influence, but at the same time it must not be forgotten that, in undertaking so serious a work as the improvement of the dwellings of the poor, half measures are unadvisable, as the object to be gained is not merely to do good, but to do the greatest amount of good, and to do it on the best system, treating all sections with equal consideration without favour or caprice.

It is a good deal owing to the claims of the higher sections having been asserted with greater prominence than those of the lower that, until comparatively recently, the latter have received so small a share of attention and help. Hitherto, these sections have been esteemed the least satisfactory and the most troublesome to deal with; the lowest most of all. The obscurity and generally disreputable character of the neighbourhoods, in which their dwellings were situated, tended to keep their condition unknown; and when at last street improvements and railways exposed them, with all their disorder, dirt and discomfort, the revelation was not considered sufficiently encouraging to justify an attempt to provide a better class of accommodation for tenants who appeared to set all rules of decent living at defiance; whose permanent occupation was doubtful, and whose regular payment of rent was more than problematical. Consequently, when the courts and alleys which had sheltered them so long were demolished, they were compelled to avail themselves of any accommodation that offered, and to accept any terms, however exorbitant, the landlords demanded. The hardships and loss to which they were subjected, were, at last, brought prominently before the public, and the necessity of doing something towards their alleviation became generally acknowledged, but no systematic work for their special benefit was undertaken until the appropriation of a gift, of unprecedented munificence, came under the consideration of the trustees to whom it had been confided.

Then, for the first time, all prejudices and prepossessions in favor of one class or another were set aside, and the claims of every section were brought successively under review: the work which had been done in improving the dwellings of the upper sections became very apparent, and showed itself in strong contrast with the little that had been accomplished for those which were less flourishing; accordingly it was decided that these needed the most help, and that a portion of the gift should, in the first instance, be applied to the erection of dwellings for the lowest section of all.

The wages of this section range, at the present time, from fifteen to twenty-five shillings per week. A few years ago these limits were different, and twenty-one shillings per week would have been regarded as a sufficient maximum, but owing to the recent increase in the price of labour, the original limits were necessarily extended until they reached their present amount. Those who belong to this section are bakers, belt makers, blacksmiths, bricklayers, candle makers, carmen, compositors, cork cutters, charwomen, dressmakers and needlewomen, engine-turners, French polishers, glass cutters, harness makers, lightermen, letter-carriers, masons, milk-carriers, painters, plumbers, policemen, porters, riggers, rope makers, dock labourers, sail makers, tailors, tide-waiters, tin-plate workers, umbrella makers, watch makers, window-blind makers, and others. Though this list contains so many of the various industries, it must not be assumed, that the followers of the principal among them, as bakers, blacksmiths, masons, tailors, etc., earn only twenty-five shillings per week, but that none who earn more wages than these, are regarded as belonging to this section, and therefore eligible as tenants of the trustees' buildings, except under circumstances which will be mentioned hereafter.

An intimate acquaintance with the dwellings and habits of life with which these persons were most familiar was found to be very desirable, before any practical improvement in their domestic condition could be begun; and as this showed both to be so neglected and miserable, it was considered impolitic to begin by making any very decided alteration in the accommodation of the new dwellings at first, or to introduce such changes as might prove unacceptable or useless from their novelty.

Plenty of light and fresh air and a liberal supply of water were put forward as the chief inducements to tempt those who appeared unwilling to forsake the arrangements of their squalid homes, which custom had led them to consider as the most convenient, for others which were strange to them. These attractions were successful, and the applications for residence soon exceeded the number of the tenements provided.

The plan of the first buildings was very simple. The dwellings were placed on either side of a central corridor, lighted and ventilated at each end by windows and by an open staircase in the middle of its length. All the water arrangements in immediate connection with the dwellings, were placed at the ends of the corridor, while the wash-houses, laundries and baths were provided for on the topmost floor. The walls were not plastered, but finished in neatly pointed brickwork, and coloured with a well sized distemper wash, of a warm tint.

After a time the corridor arrangement came to be regarded as too plain and unhomelike; the supply of air, which the open staircase afforded, was objected to, as too ample, especially in winter; more comfort and less ventilation were considered desirable, and another distribution of the dwellings was adopted in consequence. The position of the staircase was altered so as to make it more central for the dwellings which were placed round it, and this made the space allotted to the passages and landings considerably more limited in extent. The water services were provided in sculleries at each end of the staircase; the bath rooms occupied a sort of mezzanine underneath the staircase, while the wash-houses and laundries were placed, as in the previous plans, on the topmost floor.

By degrees the wasteful habits of the tenants came to be influenced by their improved position, and an increased acquaintance with the ways of decent living made them more economical. This became especially apparent in the reduced consumption of water, which, at first, was very considerable. Owing to this reduction, and to a more systematic use of the wash-houses, it was found advisable to try the experiment of excluding the washing accommodation altogether from the dwellings, and of making provision for it in separate buildings, so as to render all the floors free for use as tenements; but this alteration was attended with much inconvenience, and was found to be expensive: so an alternative plan was adopted, in which only a portion of each top-most floor was appropriated for washing purposes, the remainder being given up to dwellings. Financially, this plan answered better than any which had been previously tried, but it had its drawbacks; the chief of these was the difficulty of protecting the laundries, while free access was afforded to the adjacent dwellings, and as frequent petty thefts occurred, this arrangement was abandoned in favour of one which has been adopted in the most recent buildings, whose plan we are about to describe in greater detail.

These buildings are now approaching completion in Grosvenor Row, Pimlico. When they were begun they were intended to be five stories high—this height being usually adopted by the trustees as the most profitable—but since their commencement, difficulties of a local character have arisen, which have rendered it desirable to reduce it one story. Though this alteration will affect the accommodation and revenue of this particular group of buildings, it is so little likely to occur again, and is regarded as of so little importance as influencing the results of future buildings with the arrangements originally approved and sanctioned for those under consideration, that the following

description will refer only to the design, as proposed before this alteration was contemplated, and will assume that the buildings are five stories high instead of four.

The dwellings occupy detached blocks of building 77 ft. long, 28 ft. wide, and five stories in height. Each story contains ten living and bed rooms, so that each block contains fifty of these rooms. They are placed together for the purpose of composing dwellings of various sizes, without rendering any structural alteration necessary, and so that any increase or reduction of their accommodation may be effected by simply opening or closing doorways in the division walls. As there are twelve blocks, the whole group of buildings contains 600 rooms capable of this arrangement, and forming 250 dwellings, viz. :—10 dwellings of four rooms, 102 dwellings of three rooms, 116 dwellings of two rooms, and 22 dwellings of one room. All the blocks, with but one exception, are of the dimensions given above; this exceptional block is 3 ft. 6 inches longer than the others, to admit of certain bed rooms being converted into single tenements if required, but the general dimensions are the most convenient and the best under ordinary conditions; for they allow the blocks to adapt themselves to the irregularities which usually occur in the outlines of most sites—an advantage of no little consequence where space is limited, or established rights of adjacent properties render it necessary to manœuvre them like men of war, or fit them into their proper places, like the parts of a Chinese puzzle. As the value of a site is often considerable, and as the evils and chances of litigation cannot always be avoided without great care, it is necessary both to economize the allotted area and to be as independent as possible of rights of light, for this reason :—The end walls of the blocks are entirely plain; that is, they have neither projections nor windows. The back walls have, of course, windows, but they have no projections beyond the general face, and though the front walls have a projection in their centre, it is only sufficient to deprive the elevation of baldness, and is not enough to make any alteration necessary in the position of the scaffolding while the buildings are in progress. All the end walls are at right angles to the front and back walls, and the interior division walls are as uniform and in as long, continuous lengths as possible, and, invariably, at right angles with each other and the main walls.

This uniformity in the construction and distribution of the walls is of more importance than might be supposed, for it not only effects a saving of materials and labour, and therefore of time and money, to those who build, but it secures rooms of regular shape to the tenants, to whom the absence of angles and corners is also a source of economy, as will be shown by-and-bye.

Although straight and blank end walls admit of several blocks being connected together without interference with their light, this arrangement is not desirable when carried to excess, nor should it be adopted unless the peculiarities of the site require it. A very long building is less easily ventilated than a short one; and if more than three blocks, of the size we have given, be placed end to end, free circulation of air is impeded, and the dwellings cannot obtain those through drafts, upon which the necessary maintenance of freshness and freedom from malaria of all kinds, so much depends.

When the site is long and narrow, and there are no means of utilizing it to the best advantage except by placing the buildings in a continuous line, their height should bear some proportion to the width of open space in their front and rear, otherwise, not only is the fresh-air-ventilation impeded, but that which the light and warmth of the sun affords is deprived of its full influence, and the dwellings acquire a close and musty atmosphere, which encourages sickness and the spread of epidemic and infectious disease.

Isolated blocks should be separated from each other, and from surrounding buildings, by a distance of 20 feet, or from low boundary walls by 15 feet, and although this may be considered an extravagant appropriation of valuable space, it must be borne in mind that in all groups of associated dwellings, and especially in all those which are intended for the lower sections of the working class, every possible

means should be taken to provide an ample allowance of fresh air on their outside, for it is an extremely difficult matter to obtain its admission through either doors or windows into the interior. The working man hates fresh air at home; the elements seem to affect him but little while he is at work and his blood is warm with exercise, but when his labour is over, and rest allows his body to cool, he feels chilly and uncomfortable, he complains of drafts and too much ventilation, and attributing much of his uneasiness to the discomfort of his dwelling, he stops up every nick and crevice by which he thinks a breath might enter, and hugs himself at last in the clouds of smoke which his sulky fire pours forth in consequence. Experience has shown how vain it is to attempt any disguised device to save him from suffocation; however clever it may be, he finds it out, and renders it useless; and unless the air, which *must* find its way in when doors and windows are opened from sheer necessity, is as free from stagnation and impurity as possible, the interior of the very best arranged dwellings must be unhealthy and offensive. It is, no doubt, difficult to secure perfect external ventilation in every instance, even at the sacrifice of building space; but where the site is free from obstacles, motives of mere economy should not be allowed to interfere with the acquisition of so important a necessity. In recognition of the fact that the circulation of air is more sluggish near the surface of the ground than at a few feet above it, the lowest floor line of the Trustees' buildings is raised 12 inches above the finished ground level, and no portion of them is basemented, with the exception of a small chamber under the laundries, which is used as a dust cellar.

Each story is 9 feet high from floor to ceiling, and is similar in its arrangements: therefore a description of one floor may be accepted as applicable to the rest.

The entrance door, which is two steps above the ground, occupies the centre of the building, and affords the only external access to the dwellings. It opens into a vestibule 7 feet 6 inches wide, containing the staircase, which communicates with the several floors. This consists of sawn gazeby stone steps 3 feet 6 inches wide, with 10 inch treads $2\frac{1}{2}$ inches thick, and 6 inch risers 2 inches thick. The hand rail and balusters are of iron.

Opposite to the vestibule is a 3 feet 6 inch passage, leading right and left to the dwellings, which occupy ten rooms, and to two sculleries and a laundry situated between them, and to which they afford access.

The dwellings vary in size. Some consist of a single living room only; others of a living room and one bed room; some have two bed rooms, and a few have three bed rooms. The living rooms are 13 feet long by 11 feet wide; the bed rooms are 13 feet long by 9 feet wide. By adopting these dimensions, and making the rooms of a regular shape, the occupants are able to dispose of the more bulky items of their furniture in places where they will be least in the way, and afford the most clear space, and also to arrange their carpets to the best advantage, without being obliged to cut and alter them to fit irregular angles and corners. These are considerations which the working man appreciates, and there are others which may not occur to him or make themselves so evident, but are not less deserving of his notice, and the size of his rooms is one of them. Moderate sized rooms are more manageable than large ones, and two small rooms are more easily kept tidy than one large one. In a large room the space is generally wasted, the furniture is carelessly disposed, and the heavier and more bulky portions are huddled together so as to make their removal a matter of difficulty on cleaning days. In small rooms space must of necessity be economized, cumbrous pieces of furniture are dispensed with, and those which are necessary for daily use can be conveniently adapted to the plain wall spaces, without being crowded. Unless the furniture of a room be easily moveable, the probability is that dirt will be allowed to accumulate, and this probability will be strengthened if the room be insufficiently lighted. One large room is less likely to be well lighted than two small ones, and as even a little sun will discover dust in a

small room, where a good deal would be wanted to find it out in a large one, so there is a better chance of general cleanliness and order being established in one case than in the other. Again, in two rooms there are sure to be two windows; in one room the chances are that there will be only one; and although fresh air may be jealously excluded during the later hours of the day, when work is over, a favourable moment may possibly occur when one of the two windows will be accidentally left open, and establish a current between itself and the fire and entrance door, so as to make the stagnant atmosphere of the dwelling a little more endurable.

The living rooms have fire-places 3 feet wide, furnished with a cooking range containing boiler, oven, hot-plate and tryvet. The fire-place—that is the portion of the range which contains the fire—has had more attention paid to its size and arrangement than usual. It measures $8\frac{1}{4}$ inches by $8\frac{1}{4}$ inches at the top, $8\frac{1}{4}$ inches by $4\frac{3}{4}$ inches at the bottom, and is 9 inches deep from the bottom to the top fixed-bar, and $13\frac{1}{2}$ inches to the top fall-down bar, which serves as a tryvet. Before these dimensions were found to answer, the space, which had been made large for the purpose of encouraging warmth to the smoke, and tempting it to rise in the chimney under its deprivation of fresh air, was pronounced extravagant, and involving an undesirable consumption of fuel; so it was reduced, and then it was declared to be too small for the accommodation of the necessary cooking-pot and kettle. These preliminary difficulties being overcome, a successor appeared, which proved to be much more formidable; this, of course, was smoke. The fire itself being small, its fuel bad and scanty, and the requisite supply of fresh air almost *nil*, the troublesome smoke declined to ascend as it ought to have done, and soughed and puffed, and rolled into the room, regardless of every ingenuity in the contrivance of flue and valve that could be brought to bear upon it; nor was it until the present dimensions and plan for increasing the draft were adopted that the evil was effectually remedied. An air space, as wide as the fire and 2 inches from front to back, is provided behind the fire lump which forms the rear portion of the fire-place; this space is supplied with the air below the fire, and as this becomes heated, as soon as it reaches the hot fire-lump, it rushes up and meets the smoke, which is obliged to follow the ascending current, and consequently is carried too far up the chimney to be able to find its way down again after it has had time to cool. Each living room is furnished with a cupboard, having shelves below and a separate compartment above, fitted with a perforated zinc front to serve as a meat safe. A broad wooden shelf on iron brackets, and 15 feet lineal of picture rail, with hooks, are fixed in convenient positions against the walls.

All the bed rooms have fire-places with plain fire-lump stoves, 21 inches wide, and are furnished with 10 feet lineal of picture rail. With but few exceptions, each room is provided with a recess in the wall, having a cupboard front, and hooks and rails for hanging clothes. In addition to these conveniences which are contained in the tenement itself, the single-roomed dwellings have a separate coal-bunk in the adjoining scullery, and the two and three-roomed dwellings have roomy closets, with shelves and coal bunks, conveniently situated outside the living room doors.

Each living and bed room is lighted by a double hung sash window, 3 feet 6-inches wide, 5 feet high, and 2 feet 9 inches above the floor. The windows are not recessed in the rooms, but are fitted with window-boards, so that their external reveal is 9 inches instead of the usual $4\frac{1}{2}$ inches. This arrangement gives a solidity to the appearance of the elevations, and avoids dark corners in the rooms.

Communicating with the central passage which leads to the dwellings, are two sculleries, one at each end. Each of these contain a sink, water-closet and water supply, in connection with cisterns in the roof, which are placed immediately above them, so that all the pipes are straight, and free from complicated and expensive irregularities that cause expense when repairs are required. The sinks are of slate, and are provided with galvanized iron washing-basons and grooved wood strainers. The water-cocks are

high-pressure loose valve cocks, which resist the pressure of a high column of water upon the valve better than any others. The soil pipes are of lead, and are carried up above the roof for ventilation. In order that they may be occasionally examined and freed from the various obstructions with which they are too often choked, through the wilful mischief or carelessness of the tenants, each stack is intercepted, a few feet above its entrance into the drain, by a small examination chamber with an iron door and frame, fixed in the back wall of the building, and secured by a strong latch and key.

The laundry is reached through the sculleries. It measures 15 feet 6 inches by 9 feet 1 inch, and contains two washing tubs for washing and rinsing the clothes, a ten gallon copper for boiling, and a Bradford wringing machine; it is also furnished with lattice-framed footboards, tables, tin ladles, etc. The tubs and copper are each supplied with a cock similar to those in the sculleries. Flues and hoppers are provided for the escape of steam, and the windows are fitted with three divisions of louvred casements; the lower ones are fixed, the two upper ones are hung on centres, and their opening is regulated by a wooden bar fixed to one side to serve as a lever.

The dust cellar, which, as we have before observed, is the only basemented part of the building, is immediately under the ground-floor laundry. It is only accessible from the outside, so that when it is required to be emptied it may cause no annoyance or inconvenience to the tenants. The dust is conveyed to it from each floor by a flue, 14 inches square, extending from 3 feet 6 inches above the cellar floor to a hooded ventilator on the roof. An iron hopper is fixed in the centre of the passage leading to the dwellings on each story, which communicates with the flue or shaft by means of a lifting flap flush with the paving. Though this contrivance was supposed to prevent anything but dust or ashes from entering the shaft, its ingenuity was insufficient to prevent pieces of broken furniture and discarded clothing being thrust through it, and, therefore, small iron doors and frames, similar to ordinary soot doors of moderate size, are provided at intervals throughout the height of the shaft, to allow of its being examined and cleaned when necessary. As the hoppers are placed in the middle of the passages, which occupy the centre of the building, their situation is equally convenient for all the dwellings, and as they are fully exposed to the light of the staircase windows, to which they are immediately opposite, any carelessness in their use would at once become apparent, and its effects be removed before they could become serious.

Water is supplied to the building by a rising main, which feeds the two cisterns in the roof over the sculleries. At the foot of the main there is a small draw-off cock, worked by a crutch-handle key, that empties the main in frosty weather. The cistern overflow and waste pipe is furnished, at the overflow level, with a strong lead bottle trap, so arranged that no effluvia can pass through it from the drains, with which it communicates by means of the rain-water pipes. The cisterns are of slate, and contain together 700 gallons of water, allowing 40 gallons for the use of each family, which is sufficient for washing and all other purposes.

Baths were formerly provided in all the blocks, but their cost, and the expense of their maintenance through the carelessness and extravagance of the tenants, rendered it necessary to reduce their number; and as it was found that they were but seldom used, except in very hot weather, and then, chiefly by young men and boys, who made playthings of the fittings, only two rooms in two separate blocks have been appropriated in the present buildings for this purpose, and these are situated close to the quarters of the superintendent and porter, so that they may come under their direct supervision and management.

There is but little to remark on the construction of the buildings. The materials employed are simple and of the best description. Owing to the frequency of defective foundations on the sites which are selected for buildings of this class, and the absence of opportunity to make the necessary

excavations available for the purposes of the dwellings, in cases where these have been carried to a great depth, the superstructure above the ground line has been built upon arches, turned in three and four half brick rims in cement, between massive piers of concrete, brought up from a solid bed of maiden earth, whose position on plan corresponds with the wall spaces of the work above. By this arrangement a considerable saving is effected in the cost, and the stability of the building remains secure.

All the walls and partitions between the rooms are brick. The external walls are of picked stocks, relieved at intervals with flush bands of hard Suffolks. The external angles, to the height of the string course under the first floor windows, and the dressings of the principal entrance doorway, are of extremely hard terra cotta. The cornice consists of plain and bevilled Suffolk bricks in alternate bands, finished by the filleted cast iron eaves gutter, which serves as the crowning member. The roof is boarded and covered with Bangor slates; the ridges and hips are also of slate. The chimneys are uniformly situated with regard to the ridge, and as the fire-places of adjacent rooms are placed back to back, their number is as limited as possible.

The floors of the dwellings are wood, which is not only more comfortable than tiles or concrete, but is less liable to damage through the chopping and breaking of fuel or other similar, rough treatment to which it may be exposed. Floors, moreover, of this material, if properly constructed and provided with a well-plastered ceiling below them, offer a more effectual obstruction to the advance of fire than those which are called "fire proof," as is proved by the low premium required by the offices in which they are insured. The floors of the sculleries and laundries are covered with 9 inches square paving tiles laid upon asphalted felt and rough boarding. The passages have 4 inches gazeby stone landings; the staircase is also of stone, as already described. The whole of the internal walls are finished with a thin coating of Portland cement, which is very hard, and affords better protection from ordinary dilapidation and the increase of vermin than common plaster.

The open spaces which surround the buildings are covered with fine concrete, laid over a bed of rougher concrete 9 inches thick, and finished with a surface of Portland cement, the whole being 11 inches in thickness and laid at a cost of three shillings per square yard. This has been found to answer better than gravel, which is dusty in dry weather and occasions stone throwing and broken windows; it is preferable, also, on account of its appearance and economy, to stone or brick paving.

Generally, the buildings are substantially built and plain in appearance; their arrangements have been made as simple as possible, to ensure economy in their original construction and to avoid excessive demands upon revenue for their annual maintenance. Objections may be raised to this simplicity, as interfering too much with the comfort and domestic privacy of the tenants, and it may be said, that though the cost of land and the difficulty of obtaining sites, where dwellings are most required, may make it expedient to provide for several families under one roof, yet the evils of association are increased, by not sufficiently separating their accommodation; that the washing and water arrangements need not be in common, and that, in many of the buildings which have been erected, with a similar, though perhaps not identical object, the dwellings have secured the desired privacy, by being made self contained. It is to be feared, however, that this privacy is more apparent than real; by crowding the various water services, laundry furniture, and other domestic conveniences, into one small chamber or scullery, as it is usually called, not only is the dwelling rendered unwholesome, by having these in the near neighbourhood of the rooms, which are occupied for living and sleeping purposes, and so depriving them of their proper freshness; but the decencies of social life are seriously imperiled, if the evidence of the tenants themselves is to be believed. Self-contained dwellings, occupying several stories under one roof, cannot be compared with two-storied cottages, provided with

small yards and the requisite outbuildings, whose less confined area allows their occupants comparative freedom from observation. All the arrangements of cisterns, pipes and drainage are much more complicated in one case than the other, and their liability to get out of order and their frequent need of attention and repair, render their maintenance much more expensive and troublesome. They form, too, so serious an item in the first cost of each dwelling, that a moderate rent is unable to supply a remunerative profit; consequently a high rent is required, and those whose wages are insufficient to meet it, are either excluded or are compelled to take lodgers. Supposing, however, that profit were left out of consideration and the rents were regulated according to a scale, such as we are about to describe, it would still be undesirable to supply the poor with conveniences which are seldom found, even in the chambers and associated dwellings of the better educated. The lower sections of the industrious classes are not accustomed to treat anything, which they use daily, with much care or consideration; the strongest and plainest of the fittings with which their dwellings are furnished, are too often, incapable of resisting their roughness; and the recklessness with which they are handled and the damage which is done through their inability or unwillingness to be gentle, show how desirable it is to supply their wants in the simplest manner possible, and to give them the fewest opportunities for mischief.

The cost of twelve blocks of buildings with the above arrangements of plan and construction is £43,249. This amount includes 598 living and bed rooms, 120 sculleries, 60 laundries, 2 bath rooms, and 12 basemented dust cellars. The cost per dwelling averages £173.; the cost per living and bed room £72. 6s. 6d.; and the cost per room, including laundries, sculleries, bath rooms and dust cellars, which are in common, is £54. 14s. 8d.

The weekly rents of the dwellings in the trustees' other buildings average 2s. 6d. for one room, 4s. 3d. for two rooms, 5s. 6d. for three rooms, and 6s. 3d. for four rooms. These rents yield a gross annual revenue of £3,034 17s. After allowing a deduction of £30. per cent., or £900. for all expenses of management, &c., the nett return will be £2,134. or almost £5. per cent.

This return will not be considered sufficient to induce a commercial public to regard the buildings as a good investment for the employment of capital, at all equal in amount to the necessity which exists for them. Although it may not be enough to secure what is called "commercial success," it does more than enable the dwellings to be self-supporting; and it might be considerably increased, were not the tenants required to assent to a condition, the importance of which cannot be too highly estimated, as anyone acquainted with the habits of the poor will readily acknowledge. *No underletting is allowed under any circumstances whatever.* This restriction prevents the tenants from increasing their weekly receipts, except by their own exertions; in other words, their standard of wages continues to indicate the section of the working class, to which they belong. If, therefore, the dwellings are planned for the use and occupation of any particular section, and the rents are fixed according to the wages which that section receives; the accommodation supplied, and the rent paid are justly balanced, and no unfair advantage is gained on either side; but on the other hand, if the accommodation be too large or too small in proportion to the rent, and, consequently, to the requirements of the tenant, the balance is destroyed and loss on one side must follow in consequence.

The sectional division of the working class which we have advocated, if faithfully observed, will, it is believed, be found to do more towards securing and maintaining a just balance, and in advancing the social and moral interests of the poor, through the improvement of their dwellings, than any other arrangement which has yet been adopted, but it will not obtain a high revenue; those who require this must be willing to sacrifice the interests of the poor for their own benefit. The demand for dwellings is so great, that even the least desirable are eagerly applied for, and there is no difficulty in

letting them at rents sufficiently remunerative to realize a very handsome income. This advantage has its drawbacks however.

Independent of any condition as to the means by which their rents are paid, the tenants naturally adopt those which most readily occur to them, for the supply of any deficiency that may arise from their weekly wages. Knowing that there are many who cannot afford a home of their own, and who even prefer an unsettled kind of life, they can calculate with confidence upon a considerable addition to their funds, as soon as they are prepared to sacrifice their privacy, and to crowd their rooms with lodgers. The evils which follow need not be entered into now; but they are many, and their effects, especially upon the young, are so serious, that, were they generally known, a fairly moderate return would be regarded with less disfavour, and the present compromise between self-interest and philanthropy would come to an end.

The least profitable tenements are those which consist of the greatest number of rooms, because the rent per room is reduced as their number is increased. One room is let at two shillings and sixpence per week, but four rooms are let at six shillings and threepence per week. The reason for this is, that if the children of a family grow up or increase in number, and the means of the parents remain unaltered, or do not advance in proportion to the demands which are made upon them, additional accommodation may be supplied to them at a sufficiently low cost to enable them to continue as tenants, and to keep up, as far as possible, the feelings of propriety and self-respect with which most young people usually begin their married life. Tenements of four rooms are not often required by the section now under consideration; indeed, it might be supposed that those who can afford to pay the rent which they require, cannot be regarded as belonging to the lowest waged class at all. But instances do sometimes occur when a steady hard-working man, newly married, with wages not exceeding the prescribed limits, becomes, in the first instance, the tenant of a two-roomed dwelling. After a few years his family increases, and by industry and perseverance his wages increase also: he changes his two-roomed dwelling for one of three rooms, and as long as the children are young this is sufficient, but when they grow up he requires more space, and therefore applies for a tenement with an additional bed room, for which his earnings, perhaps assisted by those of his children, render him well able to pay. Now, it would be but a poor recognition of the claims of a good tenant, and a discouraging example to others, if he were ejected from his home because his wages exceeded twenty-five shillings; his desire to remain is therefore considered too reasonable to be disregarded, and by yielding to it, an influence is created in his neighbourhood which works beneficially. Were instances of this kind more frequent, the position of every section of the working poor would be much improved. Their self-created independence, which is the strongest safeguard of their self-respect, would enable them to discern the folly of encouraging discontented busy-bodies and demagogues who prey upon their confidence and deprive them of the sympathy and support of the classes above them.

The foregoing remarks may suggest the enquiry whether the return of five per cent., which has been given as derived from the dwellings, is based upon the cost of the buildings and all the external works connected with them, or merely upon the cost of the buildings alone. It is based on the building estimate, without reference to any expenditure on site, surface and main-drainage, boundary fences, and works connected with the adjacent open spaces and play-grounds. The reason why these are not included is, that owing to their being influenced by circumstances which are constantly changing, they cannot supply any uniform data as to their cost, which will be invariably adapted to every case.

First, as regards the site. If the site be required to be freehold, or if it be sought in a particular locality for the convenience of one particular section of poor, it may be both very difficult to obtain and very high in its price. The character of its tenure may, possibly, affect the construction of the

buildings which are to be erected upon it. Those who would be disposed to build very substantially upon a freehold site might hesitate to do so upon one that was held under an unfavourable lease. It may be subject to a high or a low ground rent; it may be in a crowded thoroughfare, or in a suburb which can only be reached by railway, and therefore quite useless for the purpose of dwellings for those who are obliged to be near employments dependent upon manufactories and large shops; it may be surrounded by lofty buildings, which exclude the daylight at an early hour, and render it unfit for the use of those who carry on work of any kind at home; it may be covered with old buildings, which must be cleared away before it can be made available for the new; it may possess a valuable subsoil, or it may have served as a general receptacle for all the refuse of the neighbourhood for years, and thereby occasion considerable outlay before it can be made fit to be used for any other purpose; its shape may be regular and convenient, or irregular and entail waste of space. These are a few of the varieties which occur in the character of the site, and which affect its pecuniary value.

Secondly, as regards the surface and main-drainage. The absence of main sewers, impracticable levels, liability to floods and the discharge of sewage through adjacent properties, will all differ according to locality, and require special provision, which may cause their cost to differ in every instance. Increased facilities must be afforded for disposing of the drainage of the spaces round the buildings, where these are large; and they will vary according to the material which covers these spaces, some being more absorbent than others.

Thirdly, as regards boundary fences. These, like the site and the drainage, are subject to great variation. Adjacent properties may supply a good fence in some cases; the shape of the site may enable the dwellings themselves to form a portion of the boundary in others. One class of neighbourhood will make high walls necessary; in another, an open railing or a wood fence will be sufficient. No uniform rule can be laid down as to what will be suitable, economical or desirable in every case, and as the material of the fences varies, so also will their cost.

Lastly, with regard to the works connected with the open spaces or play grounds. These will much depend upon the character of the site, but more upon the way in which it is appropriated. If as many dwellings are built upon it as its area will admit, the open spaces will of course be confined and small, and need only such a surface covering as is best adapted to narrow thoroughfares or passage ways; but if the health and recreation of the tenants are to be considered, and the dwellings are to have play grounds in addition to their other attractions, these spaces require careful attention. They must be made cheerful, but not ornamental, with plants or shrubs, which need constant care, and they must be covered with some durable surface, which shall neither look prison-like nor enable children to destroy it without difficulty. In limited spaces stone, tile, or brick pavements will answer well, but in large spaces these become too expensive, and as gravel has many objections, the covering which is found to answer best is the concrete already described; but even this cannot be advocated in all cases.

Thus it will be evident, that in estimating the cost, revenue, expenses of maintenance, &c. of any building, or groups of building included in one design, or regarded as one work, if the calculations are made for the purposes of comparison, they should be so divided as to show distinctly what proportion is due to the buildings alone, and what ought to be shared by the extraneous works connected with them.

The conclusions which may be drawn from these imperfect remarks may be summed up in a few words, viz.—

That before the working class, as a whole, can be suitably provided with dwellings, it should be divided, as far as possible, into sections.

That the standard of wages effects this division more accurately than any other, and affords the best means of determining the accommodation which is most consistent with the habits and mode of living of each section.

That each section should have its dwellings arranged with strict reference to its requirements, so that they may not be too large for convenience, nor too confined for the purposes of decency and health.

That the size, shape and regular construction of the dwellings, affect their cost and adaptability to the site upon which they are built, their sanitary condition, and the resources of the tenants.

That self contained dwellings more than two stories in height are undesirable as residences for every section of the working class, and the privacy which is put forward as their chief recommendation is proved, by experience, to be more apparent than real.

That the rents of the dwellings should be proportionate to the wages of the section for which they are provided, and that no more than a fairly remunerative profit be expected from them, so that the tenants may obtain the greatest amount of benefit in return for their rent.

That the evils of underletting are most serious, and considerably exceed the advantages derived from any mere commercial success, which the buildings are able to yield by its aid.

Lastly, that in calculating the cost of the dwellings, and the profit to be derived from them, their site, and extraneous works in connection with it, should form a separate portion of the estimate, as being subject to variations from which the buildings themselves are exempt.

In conclusion, the recent Act will cause many undertakings to spring up, which have for their object the improvement of the dwellings of the poor. Whether these are carried out in accordance with a definite system, or the reverse; whether their chances of success depend upon dearly bought experience or rest upon the uncertainties which arise from the mere exercise of good intention; whether the anticipated benefit affect the entire working class, or be confined to only one section of it; whether self-contained dwellings or those which are advocated in this Paper, be approved of as the best; certain it is, that after a comfortable and suitable dwelling has been provided, it rests more with the working-man himself than with anyone else (except perhaps his wife), whether it prove as great a blessing as is expected and hoped for, or not; and if the increase of wages and additional leisure, which time and change have lately secured to him, are to be spent in the public-house instead of at home, the best arranged dwelling that ever was built will do him no more real good than the most miserable cabin.

The PRESIDENT having reminded the Meeting that Mr. C. F. HAYWARD, Fellow, had promised to supplement Mr. Darbshire's Paper with some Remarks on the same subject, invited Mr. Hayward to read his Paper, which he accordingly did (*see next page*).

REMARKS ON THE SAME SUBJECT,

By C. F. HAYWARD, F.S.A., Fellow.

MOST of us are acquainted with some, at least, of the dwellings of the very poor of this metropolis and all, doubtless, lament the evils connected with them which have seemed hitherto almost beyond remedy. Therefore, I fear I have nothing new to say, nor any unknown fact to communicate, the story being too old to be unknown anywhere, particularly within the walls of this Institute.

To think that we are now discussing how to meet one of the first necessities of life, and have got no further with our nineteenth century civilisation than to recognise the fact, that thousands of honest men and women, with tens of thousands of little children, are living in such condition, that a clean dog-kennel is far preferable—is sad indeed. I said honest men and women, and I mean what I say, for however we may marvel at the fact, it says a great deal for the inhabitants of these miserable quarters, that the mass of them seem as honest and upright as the mass of those better housed and better educated, or at least, I believe, making due allowance for circumstances, in an equal proportion. And, though the stock of morality may be small, and that of education smaller still, and church-going none at all in those quarters which have come under my observation, yet the normal state of all except the worst neighbourhoods, is that of people honestly earning of daily bread by hard work, and enduring the ills they have to suffer with only too contented a nature.

The few facts I have to note, as bearing upon the present question, are chiefly with reference to a district of London with which I am officially acquainted. One supposed to be the worst, and so bad (formerly at least) as to have become a very bye-word, viz., St. Giles-in-the-Fields, though many of the fields have long ago become squalid blocks of poor dwellings. To this parish is attached St. George's, Bloomsbury. Now under the operation of, first, the Dangerous Structures part of the Metropolitan Building Act; secondly, under that part of it relating to Underground Dwellings; and, again, “under the Artisans’ Dwellings Act, 1868” (known best as Mr. Torrens’ Act), as well as by the mere change of circumstances in the locality, a large amount of the accommodation for the poorer population has been recently demolished, while not one building of any sort has been erected as a substitute. When the whole neighbourhood was already full to overcrowding, it may fairly be asked—where have all the poor people gone to?—and to this there seems no satisfactory reply. Of course, it would at first be said, they have migrated to the adjoining parishes; but, as I have official knowledge also of some of these, St. Martin’s (also in-the-Fields), and St. Anne, Soho, I am able to state that a reduction of accommodation, less in proportion, however, has been going on there also during the last two years), and so the problem becomes greater instead of being cleared up.

A list which I have drawn up shows, that from the—

(1.) Year 1871 to the present time—scarcely four years—just 30 houses containing 192 rooms, have been demolished on account of dangerous condition, as many as 500 persons (at least) were thereby displaced and dispersed. No new dwellings built.

(2.) In 1872, the Underground Dwellings of the district were visited, and 185 cases of illegal occupation found; these were cleared out, and thus about another 500 persons were displaced. Altogether, under the clauses of the Building Act, about 1000 persons were unhoused.

(3.) Nearly as many more were disturbed under the Artizans’ Dwellings Act, 1868; the sites (for the most part) of the demolished houses being still vacant, though it is said that the Peabody Trustees will occupy one portion in due time.

(4.) But quite equal to the number due to all these three causes put together, is the number of inhabitants dispersed by the "Improvements" which have taken place, owing to the falling in of leases, the erection of warehouses in place of dwellings, the widening of streets and thoroughfares, and the action of the School Board. I reckon, at the very least, 2000 people have been unhoused, and forced to find shelter elsewhere; making a total of 4000, taking a minimum average of occupation, or just one thousand per annum loss of accommodation out of a population of 53,000 for the whole district.

I perhaps might more correctly have said 5000, but I desire at any rate to keep within the limits of exactitude. The total number of dwellings destroyed is 207, and of rooms 1434 (including underground rooms).

The adjoining parishes of St. Martin, and St. Anne, Soho, during half this period, viz. two years, has lost fifteen houses and 239 rooms (including underground dwellings if not re-occupied), and thus about 600 people, at least, have been unhoused.

These underground dwellings abounded and still abound in both these neighbourhoods, and were well referred to in the *Times* at the period of their inspection in 1872, under the heading of "London Cave Dwellers." However, they are not all so bad or unhealthy as they seem, and I have known many better looking buildings and higher rooms much more conducive to ill-health and disease. They have this advantage, that the ventilation, such as it is, is at top, and is generally open, the entrance being above the ceiling line, and there are no draughts. When a fire is lighted in them, and the inhabitants of a cleanly nature, there may be much worse quarters than those cellars in Dudley Street, &c., where a large number are still legally occupied.

In the carrying out of the clearances under the Acts of Parliament, great hardships are frequently suffered. Often poor working women with large families have to be turned out at a moment's notice to save their lives; while to them it appears doubly hard to be ground down by their landlord's agent for the last penny of their high rent on one day, and then to be turned out of their poor miserable quarters, but still their *homes*, by a policeman on the next. Cases have occurred where a landlord has collected in the morning, telling his tenants he would do nothing to provide against danger, and only cared to get his rent, while in the evening not a single tenant of all the forty or fifty inhabitants was left and the place was in the possession of the contractors of the Metropolitan Board of Works, shoring up the floors and roof to prevent a catastrophe.

The clearances under the Dangerous Structures clauses, have certainly, notwithstanding the hardships sometimes endured, produced considerable good incidentally, by rendering bad localities more salubrious, or rather by reducing the insalubrity of some localities. While the Act of 1868 (Torrens Act) has, in the only case I have seen it applied, done this more directly, but with still greater hardships both to landlords and tenants. In this case too, the worst locality was not selected, but one comparatively decent, or capable of being made so, and some of the landlords had, under the compulsion of the Metropolitan Board, no sooner repaired and improved their buildings, than they were pulled down under this Act. There seemed no means of combined action, and so between two stools, both the landlords and the tenants resting upon them came to the ground, and as many as thirty houses and about 700 inhabitants were removed, while the site remains vacant to this day, though about to be occupied by Peabody Buildings.

And here I must be allowed to express how greatly I regret the loss of one whom a few weeks ago I hoped to have brought with me here to night, to have personally given us his particulars of this and other cases, on which I was in frequent communication with him—I mean Dr. Ross, the medical officer for the locality to which I allude (viz., the District of St. Giles and St. George, Bloomsbury), who has very recently died in the direct discharge of his duty, I may say, for I

believe cases connected with the execution of it hastened his death. He was one who could have told us more facts connected with the homes of the poor, not only in this locality, but all localities in London, for he had made it his business to consider the subject in all its bearings, and had (he himself told me) been frequently consulted by the Home Secretary during the preparation of the new Artizans' Dwellings Bill. No one was more careful of his statistics, and his name as a practised writer on sanitary subjects, as well as a fearless and practical worker in one of the worst localities in London, deserves recognition. In speaking also of the name of one pioneer in the cause of healthy homes, it is difficult if not impossible, for us in this Institute at least, to pass over the name of George Godwin, editor of the *Builder*, without according him honour at this hour of the day, when the subject is one of general approval and wide spread interest, for no one has more persistently, nor do I believe with more real effect, called public attention in every way—by journalism, woodcut illustrations, books, speeches, and personal efforts—to the crying evils resulting from bad homes for the poor, and the really abominable state of those homes throughout this metropolis. We ought as an Institute at this time to be glad to think that through him this profession has not been behind hand in pointing to the evils around us, and so have an answer to give to those journals which seem to take delight in taunting architects with their indifference to the evils of the bad constructions with which they often have to do unfortunately, though themselves in no way responsible for them.

I must now give a few extracts from Dr. Ross' Report of last year, which, as I have said, I hoped he would have himself presented to you, and added his own valuable experience.

"The district (of St. Giles) may be regarded as a typical one, it being constituted of the comparatively healthy St. George's, Bloomsbury, the medium sub-district of St. Giles' North, and the destitute and unhealthy of St. Giles' South. All classes of the community in the metropolis may be therefore said to be fairly represented by this district, which consequently affords peculiar opportunities for determining the influence of physical and social conditions upon mortality. This privilege of position in a scientific point of view, makes it the more necessary that our data should be accurately fixed."

Population was ...	17,843	...	in St. George's, Bloomsbury.	
„ ...	19,089	...	St. Giles' South.	} 35,586. Total of St. Giles's.
„ ...	16,497	...	St. Giles' North.	
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Total ...	53,429			

"The *increase* of population in St. Giles' has coincided with *decrease* of the number of houses, and this may be explained partly by the assumption that a large number of Irish poor—who have been turned out of their houses in the City, Holborn, and the Strand, to make way for extensive improvements—have located themselves in this district. The presence of the new comers has forced some of the old residents into other districts, the process always leaving a *residuum* behind in St. Giles."

Now the deaths in the South Sub-district were *twelve per thousand* more than the average of the whole metropolis, viz. 33 instead of 21, and births three less than deaths, viz. 29 per thousand.

These figures prove that last year, in one small part of London, 228 lives were lost chiefly owing

to the condition of the dwellings and the surroundings of the poorer inhabitants.* Yet this was no time of cholera or other special cause, but simply the general condition of things. The figures when mixed up with those of the remainder of the parish, and with the adjoining parish of St. George, (part of the district), become reduced to 25 per thousand; but even this makes the total death average over the whole locality four per thousand above the total of the metropolis. A greater contrast of figures will be seen by comparing one part of this same district with another, for while $16\frac{1}{2}$ and 18 respectively represent the best portions, being thus well *below* the total general number of the whole metropolis, the worst part is set down at 33. The deaths are thus just double the number in one part of the parish to those in the other, or in other words, in the neighbourhood of Drury Lane and Seven Dials, two persons die for every one in the locality of Bedford Square.

I will not pursue the figures further, out of respect for your time and attention, but the extremely careful annual statements, records, and calculations of the late Dr. Ross, have been a credit to the district in which he laboured so indefatigably.

Now a few words as to the *condition* of the very poor in these dwellings, and then as to the *remedy*. I quote again, because I can use no better words of my own. "This heavy mortality is largely caused by the ill-constructed dwellings of the poor, and by the water-logged soil that constitutes their foundations. The windows are constantly broken, walls damp, roofs leaky, letting in wind and rain upon occupants. A large part of our sanitary work consists in the removal of these evils, but the mischief is apt to recur as soon as it is corrected, owing to the recklessness and bad habits of the occupiers themselves, rather than to any systematic neglect of the owners."

I am speaking of and desire to be considered as referring only to the *poor*, the really poor or very poor, and not so much to artizans, who often are comparatively very well off, and ought by no means to be provided for because of their supposed want of means. This class, if they had the power of combination for their own welfare as they seem to have for any political nonsense, could easily by co-operation, build as great buildings and useful homes for themselves as their northern brethren can build large cotton mills, and so on.

Let us hope that this combination which has proved to be possible, and to be well under control, even for dangerously absurd objects, may be better directed, and that having felt their power, the "working men" (as they used to be called, but "artizans" as I presume it would be right, and certainly better to call them now), may use it to some real advantage, and that forsaking the habit of spending their time and money in beer shops and beer, they will give some of their spare time and money to providing themselves and their families decent homes without the assistance of benevolent societies. Let artizans combine and become their own capitalists, build their own houses on the sites now to be provided under the working of the Artizan's Dwellings Act, and let us all see what they themselves consider the best form of building and the kind of accommodation they require. Nothing would raise them more in the estimation of their employers, nothing show the English-like independence which, I am sure, they possess and their willingness to bear their fair share of the burdens of rating and taxation with the rest of the community, than their co-operation in this manner—so making good use of their capacity for business-like combination.

As to remedy:—"It is to be hoped that by the erection of dwellings of a more suitable character, on a perfectly dry soil, concreted or otherwise, so that 'damp' and foul exhalations may be arrested,

* Yet in some parts of the East of London—Whitechapel I believe, the mortality is even greater, being nearly if not quite 40 per thousand.

“and by a steady persistence in sanitary regulation, even the most ignorant people will be gradually taught the importance of obviating those causes, which undermine their health and bring about a premature destruction of life.”

We must not look to construction alone; that may be far in advance of the requirements of the case, and indeed has been, in my opinion often too much so—but to education—using the term in its broadest sense—not merely school learning, but improved social information of every kind; so that the better homes may be better kept, and more rational use made of the advantages provided. “The chief difficulty in keeping houses clean and habitable is found in the ignorance and apathy of the occupiers.” It is impossible to suppose that if all the poor children now wallowing in the filth and dirt of Drury Lane Courts, or in that well named locality Great Wild Street and Little Wild Street*—to suppose that when all the poor little ones of this generation have been passed through the schooling of our new Board Schools, and been taught to see how better things can be done—they will be satisfied to dwell for the rest of their lives as their fathers have, and not rather attempt in some small degree to help themselves to something better. And if this work goes on, and self-help can be evoked, there is some hope that the good leaven may leaven the whole lump, and eventually bring about a totally different state of things; so that it shall be the wonder of the next century how so many of this present generation could exist in comparative quiet and comfort amidst the evils which we now deplore.

Now for some practical details of construction. First of all the buildings must not be too good, though always capable of improvement. It seems somewhat strange for any one writing with a view to improve the dwellings of the poor, to insist that any amelioration should not go too far, as if that was the chief danger; and yet it is so necessary to insist on this, that one may say generally that the benevolent efforts which have been made in providing Model dwellings, have been as much above the power of the really poor to occupy, as if they had been offered to take up their quarters in Belgravia. Five and six shillings a week are as much above the chances of regular payment generally in the class of tenants I allude to, as £50. or £500., and all superior fittings are only disappointments, and their cost so much money thrown away.

It is difficult almost to realise—to steel one's feelings to the understanding of the real *minimum* of accommodation required. With a single room occupied by a poor washerwoman, with perhaps three or four children, a tight-fitting window and door, or an outer passage protected against draughts, is in reality but a mockery. What such families suffer from most at such homes is want of air, and when they go outside, ill clad, without any means of, or little forethought in providing against the elements, all the discomforts of cold and wet—(“pulmonary affections are the constant scourge of this sub-district,” says Dr. Ross)—and all kinds of evils resulting therefrom, come upon them, making them on returning resolve to keep out all the bitter external atmosphere, and endure all the evil smells and chances of fever rather than open a window. Many such really good rooms, if attended to as they would be by better tenants, become the worst possible dwellings for want of air, and often are far worse than more miserable looking places.

Any improved dwelling, then, must be airy, the rooms incapable of getting so supremely “stuffy,” as such often do, and no glazing need be done to the openings of the outer passages. As I said,

* Great Wild Street is thus well described:—“The streets and courts, particularly those on west side, are not only built very close together, with small yards, but are usually approached by a narrow passage under a house at either end. On the east side they are not much better. Dr. Buchanan computed that there were upwards of seventy courts and alleys in the district that either had no thoroughfare or were approached under a covered way. Proper ventilation under such circumstances is impossible. Nothing but a clean sweep of all the property, and rebuilding on a better plan, will ever make this part of St. Giles's a healthy quarter.”

however, these buildings commenced on a *minimum* scale of accommodation must be capable of further improvement. The first improvement probably when the inhabitants began to appreciate their new homes and were more civilized by their occupation, would be to glaze these openings, and so keep the passages and stairs less as cold air reservoirs. At first they would certainly be playing-lobbies for children, and unless great care was taken they would become also store places (temporary only perhaps) for lumber, as baskets, stock-in-trade of costermongers, &c. But this must not be allowed, a separate store-shed should be provided in yard. The rooms must not be too good in point of size, for space unoccupied would be costly, and such tenants as the very poor have little furniture.

It will be seen that I adhere to the usual plan of model dwellings, giving each its separate entrance from the staircase or landing on which it is situated. A good wash place, closet and dust shaft are all that need be supplied outside, but this implies a great improvement on things as at present. As they exist now, the least said of the two latter the better. Of the former there are few examples in my knowledge, but these should be adjuncts to all such houses as I am referring to on each floor.

The water fittings particularly, as well as every other detail in this destructive London atmosphere, and with the class of persons I speak of (and indeed the remark applies everywhere) should be of the simplest, strongest and best character. It is no economy to have inferior articles of this kind; they are bad anywhere, but worst of all where they will be sure to meet with rough usage and little or no care.

I have been venturesome enough to put the above into form upon paper, and now exhibit my plans, showing only one idea out of many for the present *minimum* allowance of accommodation; the lowest "STANDARD OF HABITABILITY," as it is called, below which no dwelling should be allowed to fall, (referring only to the very poor)—one idea of the form a building should take to meet the wants of the poorest classes and the necessities of economy.

This is no "model" dwelling, for it is common enough in its general form, and it is greatly capable of improvement. If such were carried out extensively, there would be no need for the societies which "improve" the Dwellings of the Industrious Classes, artizans or working men, to give up work for a long time to come. For if we begin on this low standard, we may hope for additional advantages as soon as the inhabitants know how to use them. After that time, perhaps, artizans and others may have found out how to help themselves, and begin to be ashamed of being always provided for by kind-hearted millionaires, philanthropic noblemen, and benevolent societies. All these have been invaluable agencies hitherto, and are so at present, but should be superseded as soon as possible, in the same way that all irregular agencies may eventually be superseded by better and more self-respecting business-like action. The great, and indeed the only, obstacle—viz. the want of sites—seems to be now removed, and the time for action is come.

This plan of mine was made to fit a particular spot, where houses were demolished on account of their dangerous condition some years ago, but was not adopted, and warehouses now occupy the site. Houses of the description I mention could at the time have been built on the site to pay six per cent. and I only regret my personal inability to have ventured myself upon the work, on my own sole responsibility.

"It is some consolation to be assured that there is clear evidence of a general improvement, and 'there is good reason to believe, that not only in St. Giles, but throughout the Metropolis, the sanitary regulations that have been in operation for some years past are at length producing a decided effect 'in raising the standard of health, and diminishing the rate of mortality among all classes of the community. It is to be hoped that the Artizans' and Labourers' Dwellings' Improvement Bill, 'now passing through the legislature, will largely enhance these beneficial results.'"

These last words of Dr. Ross I heartily re-echo, now that this Bill has become law and bids fair to be largely made use of, and there is ample scope for its application to the special neighbourhoods herein referred to.

THE PRESIDENT.—I think we are favoured by the presence of the Secretaries of two of the great Societies for promoting this object—viz., Mr. Gatliff, Secretary of the Metropolitan Association for the Improvement of the Dwellings of the Industrious Classes; and Mr. Raymond, Secretary of the Model Lodging-houses Association; and we shall be glad to hear any observations from those gentlemen.

MR. GATLIFF, Visitor.—Having had thirty years' experience in this subject of a more or less active character, I shall be happy to state the result of it with regard to construction and otherwise. The Association which I represent has provided accommodation in the whole for 1,060 families, and of these upwards of 800 are located in buildings of five or six storeys high; the remaining 260 are accommodated in buildings not carried up so high—160 living in cottages in the country, and between 70 and 80 in Spitalfields. It may be interesting to the members if I state the cost of these buildings. They vary from £42 per room to £54, according to the construction of them and the date at which they were erected. Some were built twenty-five years ago, when the cost of building was less expensive. The cottages average about £34 per room. The average rate of mortality in these buildings has been 14 per thousand, as against the ordinary rate of 24 per thousand, and that extends over a period of eight years. The percentage paid by the Association for the present year will amount to 5 per cent., and I have no hesitation in saying that the erection of improved dwellings in the metropolis may be regarded as a safe investment, in support of which I may state that the audited accounts of the Metropolitan Association for the last year show a gross rent-roll of £12,257 5s., of which £12,101 1s. 3d. was actually received, leaving a deficiency of £156 3s. 9d. only of the gross income for unavoidable vacancies during changes among 796 weekly tenants, and during the repairs of 3,032 rooms, and from all causes. There is one point which we have illustrated in these buildings—that is with regard to the space occupied. We have generally selected pieces of ground having on the average about 200 feet length and 100 feet depth, and erected buildings on three sides of that, leaving the remaining portion open for recreation and ventilation. The average number in the most densely-populated parts of London is about 235 to the acre. In the buildings I speak of it is about 1,100 to the acre; notwithstanding so large a space is left for recreation and ventilation, it is more densely populated to the extent I have stated. With regard to separate sculleries and closets for families, we have found it exceedingly advisable to have them. It is, of course, a more expensive arrangement; but the tenants prefer it, and pay the rents we are obliged to charge. Nothing further occurs to me, but if any member wishes for any additional information which it is in my power to supply, I shall be happy to do so.

MR. C. BARRY, Fellow.—It has been deputed to me to propose a vote of thanks to the author of the paper, and I do so with great pleasure, knowing that Mr. Darbshire has directed his mind for several years with great zeal, and with good effect to the particular subject of his paper. I believe he has in his paper, travelled over almost all the points which call for attention in this particular subject. One point insisted on by him in the early part of the paper, struck me as being of peculiar importance, and that is the advice which Mr. Darbshire gives not to attempt to mix sections of workmen of different classes, one with another in the same building. I think the experience of most in the room who have had much to do with workmen, will confirm what he has said, viz., that there is as much difference and as much feeling of superiority and inferiority between different grades of workmen, as there is amongst the upper classes of society; and any attempt to induce a master artisan to live in the same room, or the same staircase or passage with a lower class, as for instance, bricklayers' labourers, would be futile. Therefore, it becomes necessary to arrange separate dwellings, as much as possible for the different sections of workmen. In one respect the paper has somewhat disappointed me; that is, in

what seems to me the most important question of all of the day, viz.—the commercial possibility of providing dwellings on a large scale for the lower class, which may be occupied at remunerative rents by them. Mr. Darbishire and others, have rather avoided that subject. I think that it is essential if the beneficent intentions of an Act of Parliament recently passed, are to be carried into effect. I am not one who thinks that this is impossible, and my opinion is confirmed by instances I can quote and will do so, which show that it may reasonably be expected that far better and more durable and better arranged dwellings for the very poor may be provided, and pay a sufficiently remunerative rate of interest to induce people to give their money. Again, I do not think we should feel that there is any reproach such as has been suggested for mingling philanthropy in this direction with the expectation of fair returns; so long as the expected commercial returns are not allowed to be usurious. I feel that an attempt ought to be made to cope with this social evil, for such it is, and it can only be done by tapping that enormous source of revenue in this country arising from the fixed annuities possessed by a large class, who cannot afford to *give*, but would be very willing to *lend* their money for the good objects contemplated by Mr. Cross's Act if they felt secure that their investment thereunder would be as good as those they have, and that therefore their income would not suffer. In a very good report drawn up by Mr. Vulliamy, the superintending Architect of the Board of Works, and Mr. Bazalgette, the Engineer of that body, I find the following paragraph,—“There are now twenty-eight associations and individuals, some of whom from motives of philanthropy, and others in the principal of commercial speculation, have devoted themselves to the housing of 32,435 of the artisan and working classes in the Metropolis.” Now, in a city having a population of from 4 to 5 millions, it is very evident after all that is only a very small part indeed of what may be considered as a great national work, and if this work is to depend only upon the action of individuals of philanthropic tendencies who have large means at their command which they are charitably ready to devote, we shall be able to cope with but a small portion of the evil. I have great hope, that the ingenious minds of my colleagues around me, many of whom have more or less occupied their minds with this subject, will be able to devise, and I believe they will devise—some means of decently housing those working classes whose wages range between 18s. and 25s. per week, at such rents as they are able to pay, and that at a sufficiently profitable return. I agree with Mr. Darbishire, that the superior classes do not need or wish for charitable aid or help, and that it would not be willingly accepted by them. I believe them to be for the most part satisfied with their own position politically and financially, and that they are ready to pay fair remunerative rents for the dwellings, that may be provided for them. Their dwellings have already been improved by several existing associations, and they appear to give fair returns in the shape of rent. Wherever those various associations have gone carefully and wisely into the matter, that seems hitherto to have been generally the case. Those associations however, which are more or less commercial in their character and operation have hitherto dealt only with the dwellings of the better class I have just referred to; but I think a wide field is open, and a glorious field it is, for attempting to provide for the very poor labouring class, and the only principle in my opinion, on which that can be carried out to any extent is, the commercial principle of suitable remuneration for the outlay. I do not wish, in proposing a vote of thanks to Mr. Darbishire, that this meeting should think we have come to the end of this most interesting discussion. It was suggested to me that I should propose it, and at the proper time I am sure it will be received as it deserves.

Mr. G. VULLIAMY, Fellow.—With your permission I beg to second the vote of thanks to Mr. Darbishire for having introduced this interesting subject to our notice. I am sorry I have but little to say on my own experience, as I have so recently taken up the matter in connection with the

Metropolitan Board of Works, that I am as yet only a beginner and a learner. I have listened with great attention to what has been said by a gentleman whose mind has been largely devoted to the subject. I have nothing practical that I can offer. I agree very much with what Mr. Barry says, and from what I know of the present state of things, I agree with what Mr. Darbshire says; and I have no doubt there are gentlemen present who are able to contribute valuable information. I have myself received information from Mr. Gatliff and also from Mr. Allen, who seems to be almost the father of improved dwellings for the poor. For the last twenty-five years, to my own knowledge, he has been labouring in this cause. He is a practical man and could give you valuable information, which he has confided to me on several occasions. Beyond this I can add nothing on the subject.

MR. DARBISHIRE.—I will not trespass upon your time further than to express a hope that this question will be fully discussed in this Institute: but I am afraid if the dwellings of the poorer sections are to be made commercially successful, the tenants must suffer by having to pay higher rents, and to enable them to pay higher rents they must take lodgers, and by doing that one of the evils which it is sought to remedy will be continued.

PROFESSOR KERR, Fellow.—I would ask one question. I understand Mr. Darbshire to state that the deductions from the gross revenue of the houses he refers to in the way of expenses, amount to as much as 30 per cent. Does that percentage include ground rents or everything of that kind?

MR. DARBISHIRE. Freehold land is selected where it is possible to obtain it. That percentage includes all the outgoings in respect of the buildings.

Professor KERR.—I hope the Institute will have an opportunity of discussing this Paper, and will endeavour to find some means of building these dwellings without incurring actual loss.

MR. E. HALL, F.S.A., Visitor.—If I may be permitted to say two or three words, I would remind members that on a previous occasion, I ventured to suggest what I considered the proper means of treating this subject. The mode of proceeding should be that of towns improvements, in connection with which there is the collateral question (as regards large cities) of greater facilities of access by railways to the suburbs. That I believe to be the way to solve this problem, and I feel persuaded it can never be done in the way of charitable effort.

MR. C. BARRY.—I am reminded that I have omitted to fulfil a promise I made.—I said I would give an example of property of this description paying a good return upon the outlay as an investment and I may state that this has been the case with regard to some blocks of buildings put up by Mr. Freake at his own expense twenty years ago, and which pay him from 6 or 7 per cent. annually. I will give you the figures of this scheme, which may interest those who may attempt the solution of the problem. The blocks were built three floors high, each containing 42 rooms. The cost of each block was £1500; the cubical contents of each were 62,000 feet, and the cost was therefore not quite 6d. per foot—but 5.80, and £35. 14s. per room. The rents charged for those buildings are 5s. 6d. per week for dwellings of three rooms, and 4s. 6d. for those with two rooms. I think that affords some encouragement to us to attempt a solution of the problem, seeing that this property yields a nett return of nearly 7 per cent. per annum on the outlay on the buildings and the site—which cost £3000. In reference to what Mr. Darbshire has just said, I should add that underletting and the taking of lodgers is not permitted on any consideration whatever; and in this respect the same rule is strictly applied in the case of the large and important commercial Company for providing Dwellings for the Working Classes, over which Sir Sydney Waterlow presides, and in both these cases every tenant detected in taking lodgers receives a week's notice to quit. Sir Sydney Waterlow's Company has uniformly declared a dividend of 5 per cent.

MR. LEWIS SOLOMON, Associate.—There are two practical remarks I would make on this

subject. It would seem that the rents paid in these buildings range from 2s. 6d. for a single room to 6s. 3d. for three rooms, and these are regarded as applicable to the condition of artisans earning, 25s. per week. I belong to a charitable society whose officers visit the poor, and I find from their reports that very few persons, principally living by charity, pay a less rent than 2s. 6d., and in some cases as much as 5s. per week, for very dirty rooms—destitute of all proper conveniences. They could, therefore, afford to pay more than 2s. 6d. per week for a respectable room. When it is stated that wholesome and good dwellings for the artisan and poorer classes cannot be provided, to pay 5 per cent. on the outlay, I think there must be something wrong somewhere. I can buy houses, let in weekly tenements, to pay from 10 to 12 per cent., which by alterations and improvements in the shape of extra cooking-ranges, &c., might be converted into good dwellings for the poor, and yield a return of 8 or 9 per cent. I think if more attention were directed to this matter, these dwellings could be made to pay commercially.

MR. HORACE JONES, Fellow.—I have had some experience, though but little, in this subject, and I do not find that there has been this large percentage gained. In two or three instances I have looked at, an average of about 4 per cent. is the return upon the capital expended, and I feel accommodation is given to the occupants of these rooms, or chambers, which people resident in such places as the Temple do not usually have. I cannot help thinking a higher amount of accommodation is accorded to the so-called poor in the case of these dwellings than is given to the rich in chambers and apartments. I can hardly see the necessity for providing separate water-closets for each set of single room-dwellings and it is quite competent to provide good homes, with all reasonable accommodation, including an abundant supply of water, without giving them too great an amount of extraneous luxuries. I know in the City of London good comfortable accommodation of two, three, or four rooms, can be supplied to be occupied by tradesmen—not tradesmen who buy and sell, but, in the old-fashioned sense of the term, that everyone who lived by his labour was called a tradesmen:—artizans whose business requires them to be immediately upon the spot—and they pay from 2s. 6d. to 3s. 6d. per room. But the cost of land in London is so high that this description of property, I believe, very rarely gives a return of over 4 per cent., and the way in which these improved dwellings can be made what is called commercially successful is a point which I am afraid we have not arrived at yet. I have seen in other districts, and in the country, good accommodation at much cheaper rents; but the arrangements there were not of the kind that have been described. Every room did not possess the requirements of a whole house. I daresay many here have visited Holland. There is no nation probably more careful in their cleanliness, or more frugal in their thrift; and it is most interesting to see what small places the workmen's dwellings are. They are all self-contained, but they are on the smallest possible scale. A great deal of the household work is done out of doors in the fine weather especially; but the dwellings themselves are little more than sleeping bunks. At this late hour it will be impossible to discuss this subject as it deserves to be discussed; but I trust, with Professor Kerr, that we may have a future opportunity of doing so, when, with further plans and additional information before us, we may be able to devise a better scheme than has been the case up to the present time.

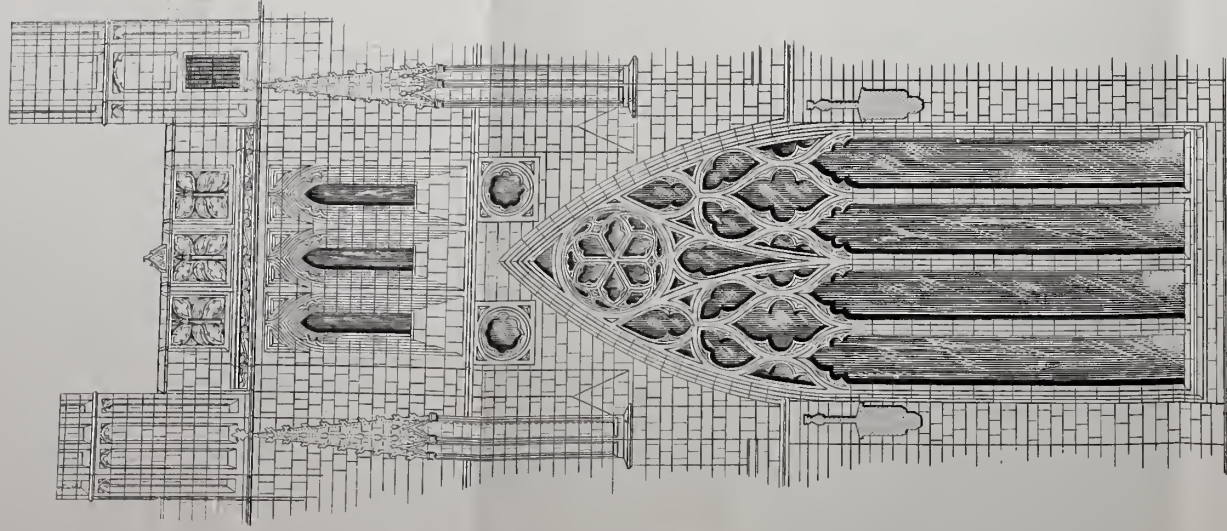
THE PRESIDENT.—As it is getting late, I will do little more than express our hearty thanks to Mr. Darbishire, and couple with that our thanks to Mr. Hayward, who deserves it equally in proportion for what he has given us. I wish I could add something worth your hearing, but I will only trouble you with one idea which struck me during the latter part of the discussion. This great object of providing improved dwellings for the working-classes, as Mr. Barry said, can never be carried out on the scale absolutely essential, and commensurate with the health of the population by charitable and philanthropic means alone. It can only be carried out by what Mr. Barry calls "tapping" that enor-

mous fund of wealth whose owners cannot afford to give, but who can afford to lend, perhaps at a moderate interest. We know when we are ourselves proposing to take shares in anything doubtful, we are very much helped in making up our minds if we find that the interest upon the money is guaranteed by some public body. I would ask, are there no public bodies which could guarantee a certain minimum rate of interest for the money invested in this direction? Cannot the City of London, for instance, cannot the Metropolitan Board of Works, cannot the corporations of large towns and cities guarantee some minimum below which the rate of interest would not be allowed to sink? We cannot, perhaps, hope to raise that minimum to anything like what Mr. Freake has made, but this is not needed. The Government itself might be willing to give a guarantee; but certainly great public bodies, like the Metropolitan Board and the Corporation of London, might do so under Parliament sanction; and then people would allow their resources to be "tapped," and we should be able to do all that is wanted. Even with a guarantee of 4 per cent., how many people would invest money in this good work. This is the only remark I have to make, and I suggest it as worth thinking of.

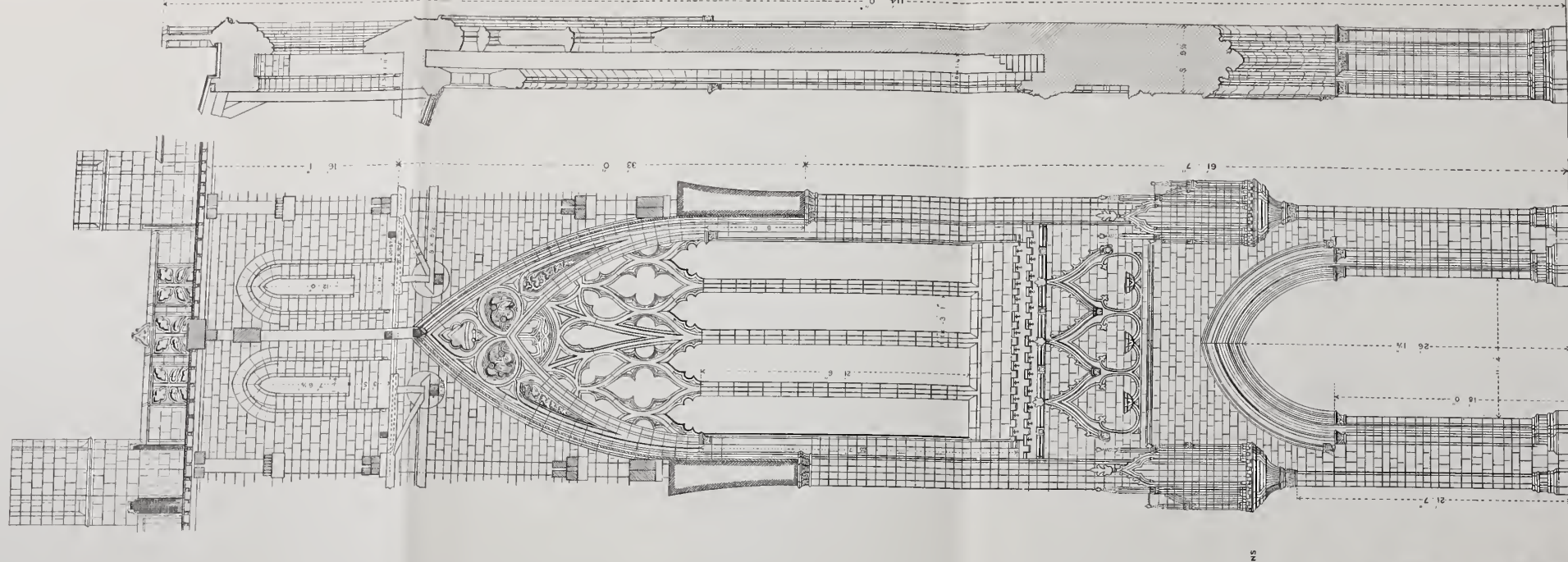
After a few other remarks, the discussion was brought to a close, and the meeting adjourned, after passing a hearty vote of thanks to Mr. Darbishire and Mr. Hayward for their Papers.



ELY CATHEDRAL THE OCTAGON

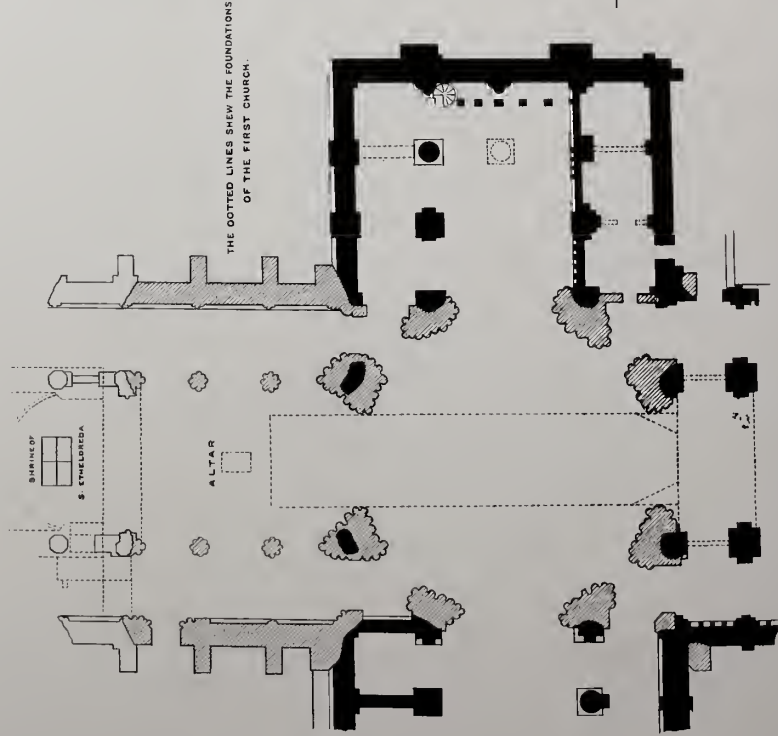


EXTERIOR ELEVATION OF A
N.W. N.E. SW. OR S.E. SIDE.



INTERIOR ELEVATION OF A
N.W. N.E. SW. OR S.E. SIDE.

SECTION.



THE DOTTED LINES SHOW THE FOUNDATIONS
OF THE FIRST CHURCH.

GROUND PLAN.

SCALE OF FEET

REFERENCE TO THE GROUND PLAN.

Norman
Work of Alan de
Walsingham

Royal Institute of British Architects.

At an Ordinary General Meeting of the Institute, held on Monday the 3rd of January, 1876,
SIR GILBERT SCOTT, R.A., President, in the Chair, the following Paper was read:—

THE OCTAGON AND LANTERN OF ELY CATHEDRAL.

By R. REYNOLDS ROWE, F.S.A., Fellow,
(Surveyor to the Dean and Chapter).

THE FOUNDATION.

IN the midst of the Cambridgeshire fens rises a high hill of Kimmeridge clay, about eight miles in length by five miles in width. On the south-east side of the hill is found a considerable formation of lower green sand, containing at a depth of from 6 to 10 feet a stratum of intensely hard sandstone rock.

In A.D. 673, Etheldreda, Queen of the Isle of Ely, gave practical effect to the words she was accustomed to hear recited by the priests of the Saxon Church—" *super hanc petram ædificabo ecclesiam* " *meam*," and upon the sandstone rock laved by the navigable river Ouse as it flowed on its way to the great estuary of the Wash, she selected a site seventy feet above the river level, and founded a monastery, containing a church, within which she hoped the daily office might be sung throughout all time. Acting upon the earliest instincts of fenmen, her monks and retainers made from the river to the monastery an artificial cut, called then as now a *lode* from the Saxon word "*lodian*," to draw.

The river and lode, which brought provisions and building materials to the monks, also enabled the pirate Danes and Norsemen to invade the Isle of Ely, and sack and destroy the monastery A.D. 870.

In A.D. 970 the Saxon Ecclesiastics reconstituted the monastery for monks, under the rule of S. Benedict. William the Conqueror, making Cambridge Castle his headquarters, laid siege to the Isle of Ely, but raised the siege several times in consequence of the heroic defence of Hereward, and the difficulty he encountered in crossing the wild waste of waters and bog with which the Ely hill was surrounded. At last, during a season of excessive drought in A.D. 1071, William found only a narrow piece of intervening water, which he filled up with a causeway, and so obtained a firm place of crossing near Aldreth, and took the monastery. The late Canon Kingsley, in his very interesting book, "*Hereward*," gives much authentic matter as to this period of our history.

During the century from A.D. 1083 to A.D. 1183 the nave, transepts, and a short apsidal choir were built.

Queen Etheldreda being canonized, and the Ely monks obtaining possession of her remains, which were deposited in a rich shrine, Bishop Northwold, in A.D. 1235, removed the eastern apsidal termination of the early Church (all but the foundations), and lengthened the choir by erecting the presbytery as a canopy over S. Etheldreda's shrine.

THE OCTAGON.

In A.D. 1322 the central tower fell from its own inherent weakness, maleconstruction, and defective foundations, as the late Professor Willis sagaciously explained to the members of this Institute in the case of the fall of Chichester Cathedral tower.

The earliest structures in Ely were made with their foundations but a little way in the sand, which being alternately saturated and dry, is likely to cause settlements in buildings erected thereon, even though the wall footings are very broad. The general drainage of the fen country by steam power under Rennie, Walker, and others, has been so perfect that a flood is now of rare occurrence, and the great area of moor and bog that supplied food for wild fowl, and eels and ague for man, presents at harvest time one of the richest scenes of waving golden grain and pastoral beauty to be found in England.

In 1845, when the choir was repaved, the foundations of the 12th century apse were discovered in situ: they exhibited the loosest kind of construction, and clearly revealed why the tower, being founded upon such masonry, fell.

In 1851 the Local Board of Health sewered the city of Ely, and permanently lowered the water level in the sand bed. Since that date serious settlements have occurred in the choir and south transept; they have been carefully under-pinned down to the rock by direction of our President, Sir Gilbert Scott. The west tower has also settled, and been banded with iron under the same direction.

Although out of chronological order, the foundation question is specially detailed here to make more vivid the prophetic skill of the sacrist of the cathedral, Alan de Walsingham, who, seeing the tower fall, immediately devised plans for its re-edification. Acting upon the good old proverb that "prayers and provender hinder no man's journey," he retired for three days' prayer before commencing his design, and, in the spirit of Fra Angelico, worked for the praise of God to make the second building more glorious than the first.

The ground plan hereto annexed, copied from the exhaustive monograph of the Cathedral by the Rev. D. J. Stewart (formerly sacrist), will show how Alan de Walsingham proceeded; he cleared away the pillars and arches of nave, choir, and transepts, which came down with the falling tower, and instead of blocking up the vista with a new tower upon four bigger piers than before, he devised an octangular tower, resting upon eight pillars, and founded them upon the solid rock—not merely as an engineering feat, but to symbolize the Church's one foundation. The masonry of the octagon, being wholly constructed with equal care, is at this day perfectly free from settlement, the stone used being Barnack, Weldon, and other Northamptonshire oolitic stone, obtained from quarries approachable by water in times of flood. The stone of the exterior is but little decayed, for all employed herein, from the quarryman to the bishop, felt they were engaged in a religious work, thus none but sound beds of stone were sent from the quarries, and every stone was honestly used bedwise.

How different this ingrained moral rectitude and its holy calm, from modern work, with flash competition drawings, a highly self-opinionated building committee, a scamping contractor, the lowest tender always accepted, and workmen on strike at the dictation of paid agitators.

Besides, "Ely use" meant only the use of the best, whether in Church music, ornate ritual, sincere worship, building materials, or food and the way to cook it; so that vessels from Antwerp to Ely were annually laden with Burgundy and Moselle of such superior quality that the proverb obtained

throughout Britain, "as good as the wine of the monks of Ely." This proverb is in full force now, as the stately services, daily, and the unbounded hospitality of the capitular body often evidence.

The octagon is regular, but unequal-sided, each of the four cardinal sides next the nave, choir, and transepts, measures on its outer face 40 feet, and each of the diagonal sides measures 27 feet. Each cardinal side on the ground floor is pierced by a pointed arch, 25 feet span, having its springing line 61 feet 7 inches above the pavement level. Each diagonal side is pierced by an arch 11 feet 4 inches span, and higher up by a four-light window. On each diagonal side, between the point of the arch and the window-sill, are three shallow niches, with bold corbels, upon which were placed seated figures of the Twelve Apostles: the hood-mould terminations of the niches representing the heads of the sixteen major and minor prophets of the Old Testament.

Parties of Nonconformists, under Cromwell the regicide, refusing to allow people to "worship God in the beauty of holiness," "brake down the carved work with axes and hammers," and destroyed in their blind and ignorant fury, among other works of sacred art, the original figures of the Twelve Apostles. New figures have recently been carefully sculptured by Mr. Redfarn, of London; only three now remain to be fixed.

Attached to each pillar of the octagon is a shafted empty canopied niche of surpassing beauty, resting upon an undamaged corbel, sculptured to represent a legend in the life of S. Etheldreda. For many years antiquaries were puzzled as to whether these were niches or only pieces of rich mural decoration. That they are niches is clear from their canopies, and believing, as I always have, that a niche without a statue, or a shield without blazon, is as unmeaning and valueless in its architectural and historic teaching as a deed without a seal, it was with much gratification my excellent friend, Mr. William Burges (Fellow), told me where I should search for a portion of one of the destroyed statues, as he had found it when studying the Cathedral some twenty years ago. Most surely, a three-quarter length of a statue, in Burwell clunch, is resting in the south triforium that once belonged to one of the niches of the octagon; it was exhumed from under the nave floor during the present century. An Iconographer names the eight great Doctors of the Church as fitting subjects for the niches, and as a clever local figure sculptor has offered to make them at £20 each in Corsham stone (exclusive of fixing), it is hoped that eight friends to the Cathedral may volunteer to fill up the empty niches.

The choir is the only part of the Cathedral that is vaulted, the western vault rib becoming a sub-arch to the eastern arch of the octagon, the space between the two being filled in with tracery, and forming the position of the ancient rood. On a corbel springing from the apex of the hood moulding of each of the four great arches, at a level of 87 feet above the pavement, is seated a stone figure of an Evangelist writing his Gospel on a scroll, resting on a stone desk, and having in the desk an ink-horn of the kind common then, and in Dogberry's time; a precise illustration of the ink-horn may be found in the "Dictionnaire Raisonné du "Mobilier Français," by M. Viollet-le-Duc, p. 165.

In 1865 a stone pulpit, from the design of our President, was erected in the octagon abutting upon the north pier of the great choir arch; its foundations, like those of Alan de Walsingham, were carried down to the solid rock, not only teaching that the Word of God is as a firm rock, but thus symbolizing the real, though mystic, unity of the divine *Logos* and the divine *Petros*.

Externally, Alan de Walsingham finished the octagon with a pierced parapet of flamboyant tracery at a height of 114 feet 10 inches above the nave pavement: the parapet on each cardinal side having part of a pinnacle set diagonally in its centre. Each pier of the octagon is crowned with an irregular panelled octangular turret. When these eight turrets had been built up to heights varying from 6 to 10 feet above the parapet, the four pinnacles to a less height, and the parapet in part only had "brattishing"

placed thereon, about A.D. 1330, the masonry was suddenly stopped for want of money, or some other builder's trouble, with which we here are too familiar; and so it remains to this day.

The existing capitular body being imbued with an intense reverence for the wonderful building entrusted to their care (as shown by an expenditure thereon of £57,000 during the last thirty years), instructed our President to prepare a design for completing Alan de Walsingham's stonework. This design, made in the year 1862, hangs upon the wall; a perspective view of it was published in the *Builder*. I have the satisfaction of announcing that during the past year (1875) the Dean made an appeal to the public for funds, which was so amply responded to, that the Dean and Chapter are about entering into a contract for finishing, in Clipsham stone, this important work, after it has remained in abeyance for 545 years. Such a loving exhibition of faith and patience is unfortunately seldom met with in these days.

Alan de Walsingham also constructed upon the solid rock, in the outer lines of the aisle walls, four piers, or buttresses, each capped with a stone pinnacle and receiving a pair of radial flying buttresses from two angles of the octagon. There were two beautifully-sculptured Norman doorways opening into the cloister at the south-west outer angle, just at the point where an abutting pier to a flying buttress was needed. He treated the Norman work in the most conservative manner by incorporating the doorways there most skilfully with his own new pier, which sheer constructive necessity demanded. Hitherto, for the sake of distinctness, I have spoken of the octagon alone.

THE LANTERN.

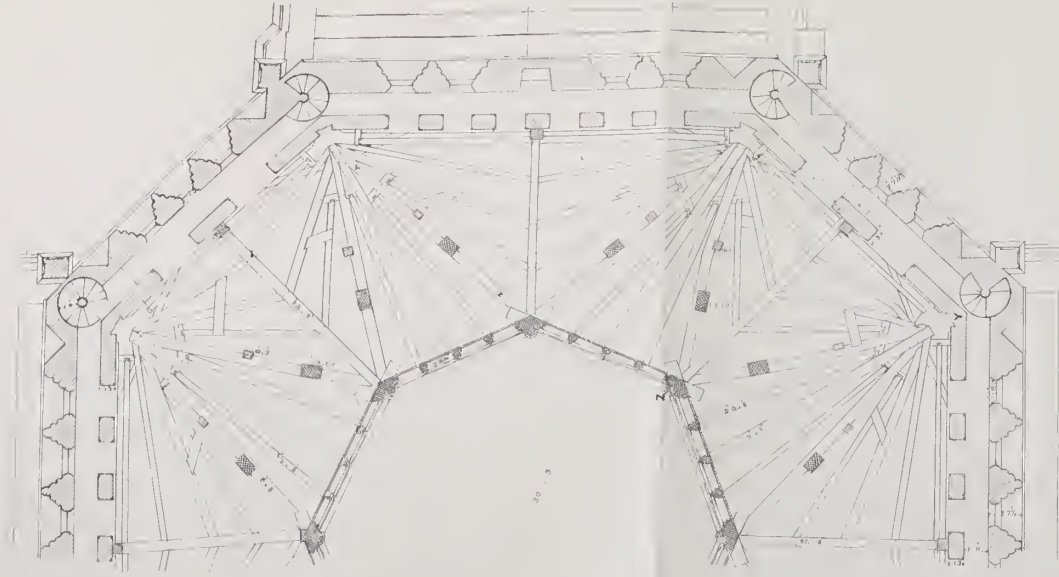
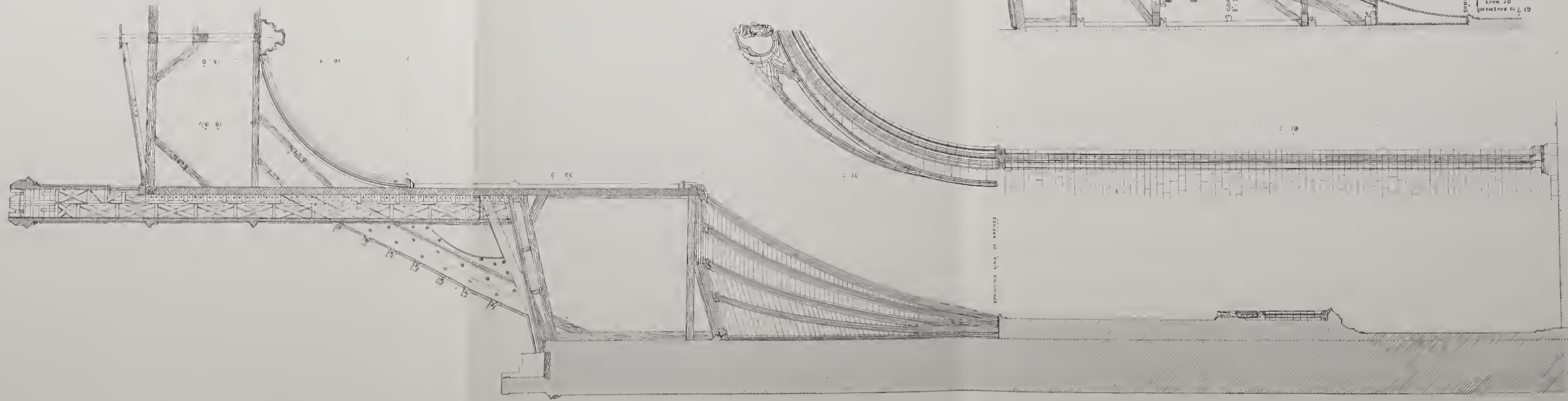
The stonework of the octagon being so far completed, Alan de Walsingham then solved the problem how best to roof with oak an octangular building 74 feet diameter.

Upon a stone corbel in each of the eight great piers of the octagon, at the same level as the springing of the four great cardinal arches (61 feet 7 inches from the pavement) he built a series of vaulting ribs terminating at a kerb, 21 inches by 16 inches, fixed at a level of 93 feet 9 inches above the pavement.

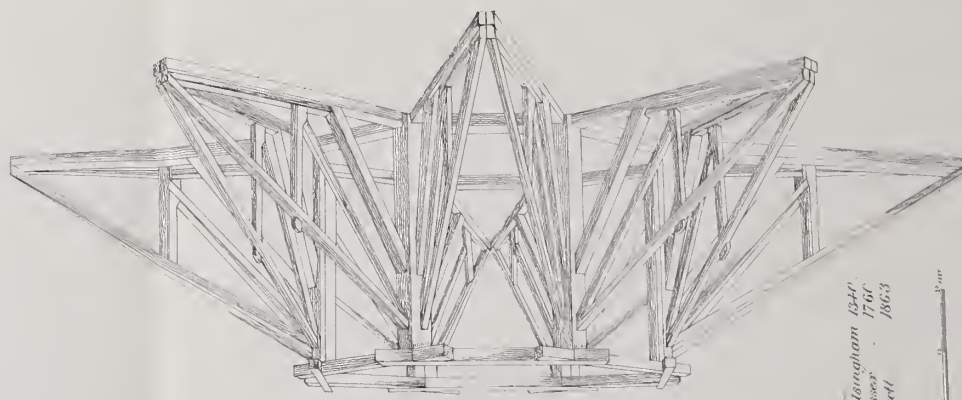
It will be observed by the drawings that the oak kerb forms a regular octagon, 13 feet on each outer face, or 29 feet 6 inches clear internal diameter; but the octangular sides of the kerb are set obliquely to the faces of the stone octagon. This arrangement, though it gives an infinite variety of curved lines to the vaulting ribs as they are seen from below, yet causes a certain distortion in the ribs themselves; though each rib was doubtless originally carefully set out by ordinates, it is impossible now to trace the theory of those ordinates, because the summer heat of five centuries has twisted many of them into the fantastic curves of Chesterfield spire.

It is recorded that Alan's greatest anxiety was caused by the difficulty he experienced in finding eight great sound oak trees near to good roads wherewith to make the eight angular posts of his lantern. Animated by the same spirit as when he began his work, he sought to make "the trees of the wood rejoice before the Lord," and after many tedious personal journies his unflagging energy was rewarded by the purchase and delivery of eight trees, each being 50 feet long, and giving a sapless scantling of 2 feet 9 inches by 1 foot 9 inches. These being moulded and framed into the oak kerb formed the first pieces of framework of the lantern. The oblique setting of the lantern enabled two radial diagonal struts to be fixed to each of the eight angle posts, their lower ends resting upon corbels opposite the walls of the nave, choir, and transepts; thus securing irresistible abutments and wind braces. The skill evinced by this radial principle cannot be over-rated. Having frequently spent much time

ELY CATHEDRAL
THE LANTERN



PLAN AT 100 FEET ABOVE PAVEMENT OF NAVE
N.B. All Woodwork upon this Plan is Oak.
Joists are 8 inches deep



SECTION FRAMING ON LINE Y Z
ON PLAN ABOVE

REFERENCE
The original work of Man de Walsingham 1341
Works of Repair by William Essex 1766
Restoration by Sir Gilbert Scott 1863

upon its contemplation in the lantern, I could not fail to be arrested by the similarity of principle in the stone-vaulting ribs of the octagonal nave of the Cathedral in Aix-la-Chapelle, when recently visiting the grave of Charlemagne.

Level with the kerb, a floor of oak joists is constructed, also radial, I believe, for a wind-brace effect. At a level of 18 feet 3 inches above the before named kerb, a second kerb is framed between the posts, forming the sills of four-light traceried windows, each being 15 feet 5 inches between the sill and springing of arch; at this same springing level, 130 feet above the pavement, rises fan-vaulting to a point 152 feet 6 inches above the pavement, the vault ribs radiating into a magnificent central oak boss, sculptured so as to form a practical exposition of the great central doctrine of the Incarnation. The space in each bay of the lantern between the two kerbs is filled in with a traceried parapet of quatrefoils, breast-high for safety, above that are four panels terminating with rich tracery. The upper stage of the lantern formerly contained a peal of bells, as proved by the grooves worked in the vault-ribs by the friction of the bell ropes, which reached to the pavement. The interior of the lantern was decorated with painting, but great doubt exists as to the design and colours.

The foregoing is incomplete as to the condition of the lantern when it left the hands of Alan de Walsingham, because during the dark ages succeeding the Reformation and continuing into the Georgian era, the diocese of Ely was known as "The Dead See," and the cathedral was neglected; *e.g.* children were sent to play in it on wet days, coal carts were taken along the nave floor because the traction was easier there than in the city street, a farrier's forge occupied the baptistry, pigeons were bred and shot in the cathedral, the result of this neglect is fully set forth in a MS. No. 5842, in the British Museum, entitled:—"A Survey of the Cathedral Church of Ely and Trinity Church adjoining, made July, 1757, by order of the Dean and Chapter, by James Essex."

I recently copied that portion of the "Survey" relating to the lantern, as follows:—"The next part to be considered is the lantern, which being a work of the greatest importance, the neglect of it may be attended with destruction of the church and the loss of many lives. For whoever considers the magnitude and weight of this tower, with all its appendages, and the manner in which it is supported, must allow that the greatest care is required to preserve it in the state it ought to be: that so great a work wholly supported by timber necessarily requires that the supporters be kept dry: that to neglect the means of keeping them so must be attended with ruin, or unavoidable expensive repairs. The latter of which is at present the consequence of neglecting the necessary repairs, or doing them improperly after they had been too long neglected.

"The prodigious quantity of timber and lead of which it is composed, was at first supported by sixteen pieces of timber only, of which number seven or eight are now rotten and unfit for supports, so that the whole weight is now unequally supported by those that remain sound. The cause of this decay is owing to the neglect of the gutters, and the leadwork over the lantern chamber and other parts of the lantern, which has either been improperly repaired or quite neglected for several years past, and instead of lessening the weight as much as possible when the supporters became weakened by time, I find that many hundreds of lead have been added to patch and hide what might have been otherwise repaired at less expense, so that now much of the work is covered with lead that was never intended to be so. From this ill-management, not only the timbers before mentioned, but many others of consequence are in bad condition. The windows in general are so bad and loaded with lead that it is impossible to repair them. The roof over the lantern chamber is so bad that hardly any water can get off it, and the kirb on which it rests is so decayed that the whole roof should be taken up and laid with a proper declivity to carry off the water. There are likewise two of the turrets that want rebuilding, one of them particularly is unsafe, having very little hold and may be blown down.

“ As nothing but a general substantial repair of this lantern can prevent its ruin, it would be the greatest imprudence and extravagance to enter upon a partial one, I shall therefore recommend it as the safest and cheapest scheme to resolve upon doing it effectually; and the sooner it is done the better, for the longer it is delayed the worse it will be, and the greater the expense; for as it is now impossible to keep out the wet effectually without a regular repair, it will be impossible to prevent the timbers from rotting, more especially as they are already much decayed.

“ In what manner this lantern, &c., together with the turrets and masonry ought to be repaired and the method of doing it cannot be explained without proper plans and sections of the different parts, which should be made when a thorough repair is resolved upon. Amongst all the necessary repairs that I have remarked in this church, there are none which require such immediate care as the lantern, for a further neglect of that may be attended with very bad consequences.

“ But although this ought to be the first part that has a thorough repair, the other parts ought not to be entirely neglected, for care should be taken in time to prevent any mischief by securing them for the present, and at a more convenient opportunity to repair them effectually. It will be proper to take care that the workmen clear away the rubbish they make as well from the tops of the vaults as from the gutters, that the pipes and cesspools be kept clean in all parts of the church, and that the old bell frames and other lumber be taken out of the lantern, and all the stones and rubbish cleared out of the leads over the lantern chamber.

“ Next to the lantern, the roof and other parts of the presbytery should have a general repair, but until that is done, care should be taken to keep out the wet as much as possible.”

James Essex was the son of a carpenter in Cambridge. He was a clever architect and the pioneer of the revival of Gothic architecture: to him was entrusted the duty of repairing the lantern; however his work may now be criticised, all will admit that we have to thank him very much for his conservative treatment of an impending ruin, and but for him we should have no lantern now. He took out many decayed timbers and inserted others with considerable skill; notice his method of scarfing the decayed ends of the main diagonal supports (as shewn by the drawing). We wish, of course, he had placed sound timbers precisely where he found old ones. He took down the eight turrets from the outer corners of the lantern, and rebuilt them on a smaller scale, placing their faces parallel with the lines of the stone parapets of the octagon. He covered the whole of the woodwork with lead.

Dean Peacock, who wisely appointed our President Sir Gilbert Scott, architect for the restoration of the Cathedral in 1845, died in 1858; his successor Dean Harvey Goodwin, now Bishop of Carlisle, determined to restore the lantern to its pre-Essex condition as a monument to Dean Peacock. The lantern as now seen from the exterior is the work of Sir Gilbert Scott, it is copied as nearly as may be from ancient prints, aided by mortice holes found in Alan de Walsingham's work. Thus, the turrets are now set angle-wise, exhibiting the Northern energy, of which in Ely Cathedral there is no lack; their timbers are placed in the old mortice holes; eight windows of the worst churchwarden kind, have been replaced by new windows designed upon Alan de Walsingham's type. Substantial flying buttresses have been fixed from the turrets, through the roof to stone corbels. The height from the pavement to the top of the lantern pinnacles is 170 feet 7 inches.

The whole has been covered with lead; the fortunate absence in Ely of any smoke-producing factories that act upon the lead of the roofs, has caused the new lead of the lantern to remain the same raw colour as when first laid; the Dean and Chapter will be pleased to learn from the Members of this Institute their opinions as to the effect of parcel gilding the lead work, also as to whether the top of the lantern should remain flat as St. Ouen at Rouen and Boston in Lincolnshire, or whether a flèche should rise from it as at Amiens, and Notre Dame in Paris.

The Bissexcentenary Festival of St. Etheldreda, October, 1873, with its octave of magnificent services, drew much attention to the Cathedral Restoration, and created a desire to continue the work; it was deemed advisable to finish one part at a time, and with that object in view to complete the lantern first. Mr. Gambier Parry, who had already painted half of the nave roof, volunteered to decorate the interior of the lantern; his noble offer was accepted, and I was directed to prepare a scaffold for his use and repair the vaulting boarding, which, for the most part, was of sappy wany Gefle deal, much worm-eaten. More than 100 sacks full of jackdaws' nests, shavings, and chips, were taken out of the pockets of the lower vaulting; best picked Petersburg red deals were cut to 7 inch widths to get rid of every trace of sap, sawn, planed, and grooved for tongues by machinery, then stacked over a steam engine boiler to ensure perfect dessication; these were carefully fitted and fixed to the vault ribs, and well painted hoop iron tongues inserted. New panels of similar deal, put together with oak buttons to allow for shrinkage, were placed in the openings between the first named kerb and the window sills, leaning 3 inches out of the perpendicular so that dust may not readily rest upon them. The great central boss, being much damaged by pigeon shot, was restored by a careful carver. Panels were made to fill in the stone tracery openings of the ancient rood.

THE SCAFFOLD.

Just as it is a *sine quâ non* in all railway repairs that the traffic be kept open, so is it in all cathedral works, that the daily services be not omitted; therefore the scaffold was to be designed with that object in view, and especially so that the popular Sunday services in the octagon be continued as heretofore. I therefore determined to form a close boarded floor over the whole of the octagon, at a level of 2 feet below the work to be painted, and to make it independent of the pavement.

Upon the breastwork of the lantern, at a level of 100 feet from the floor, four half timbers were laid (crossing each other), their ends running well into the lantern framing, and sustained by struts and suspension rods so as to distribute the strain over as many diagonal struts as possible, and by them to take it down to the walls. Eight $1\frac{1}{4}$ inch suspension rods, 41 feet long, of the very best Staffordshire scrap iron, each tested on the spot by an hydraulic ram to twenty tons, were suspended from the half timbers; a framed platform, 29 feet 6 inches square, was hoisted by three crab winches, until it dropped into the hooks of the suspension rods provided for it, at a level of 59 feet from the pavement. The curved hooks in the suspension rods were then bound with telegraph wire to prevent accident by any sudden jerk; this method avoided the uncertainty of welding, and in that position was simpler than nuts and screws. A 12 by 12 gantry was set up in each stone gallery at the same level as the platform. Across the nave and each transept, a whole balk of timber was hoisted into the upper triforium or clerestory, and blocked up to the level of the platform, each balk being stiffened in the centre by a suspension rod from a floor joist at the kerb level, passing through the vaulting. It was found impossible to hoist a similar balk in the choir without damaging the stall work: therefore the idea was abandoned.

From the foregoing, it will be seen that, by placing joists from the long balks and window gantrys to the central platform, a floor was at once formed. It was intended to take all strain off the eight suspension rods by placing a whole timber diagonally from each stone gallery to an angle of the platform, and wedging it up tightly, but, unfortunately, before the scaffolding was finished, a painter's boy fell from the upper platform, at a level of 100 feet from the pavement, and was of course killed on the spot. This created such a panic in the City, that people there imagined the cathedral was about to fall, and that the catastrophe would happen the following Sunday while the regiment of militia was worshipping in the

octagon. To allay this panic, four upright balks of timber were placed upon the pavement to support the platform. Upon the platforms, at the respective levels of 59 feet and 100 feet above the pavement, ordinary scaffolds, with poles and cords, were erected, and gas lights laid on for the use of the painters; all the work was well stopped and prepared, and received four coats of strong oil colour as a ground work for the decorators. The scaffolding to the choir arch was corbelled out on cantilevers. The scaffolding was erected and removed without the slightest damage to any part of the cathedral; frequent observations were made as to whether it caused any strain upon the lantern, but none could be detected.

I felt it my duty to take advantage of the scaffolding for making the set of sixteen large scale drawings that illustrate this Paper, so that in case of the accidental destruction of the lantern by fire, an authentic record might exist for the guidance of the restorer.

THE DECORATION.

As to the decoration of the lantern, I prefer appending Mr. Gambier Parry's own description of his loving work, which illustrates the 140th Psalm.

"The ornamentation is in the style of the fourteenth century.

"The central boss of the lantern groining is a half-length figure of Christ in glory, considerably above life size, and with the conventional clouding around it; it is boldly carved in oak; the right hand is raised in the attitude of blessing, and with the left the inner garment is drawn open to exhibit the wound in the right side.

"Around this figure is painted a galaxy of seraphin on a grey blue ground. The panels of the window hoods are painted red, marking the distinction already made by the architectural construction, and on them are painted cherubin and golden stars. The windows of the lantern were filled, some years ago, with coloured glass, of a cheap common kind, owing to want of money. The colouring of these windows is harsh, and in strong contrast with the mellow and rich painting of the woodwork, and very injurious to the general effect. Below the windows are thirty-two openings, surmounted with rich tracery; they are filled by panels, on which is painted an angel choir. The figures are composed in groups of four, under each window, and are represented playing mediæval musical instruments. The two eastern and two western bays are intended to be severally grouped together, each group forming a distinct series of eight figures. The instruments in the hands of the figures over the transepts are the psaltery and cithern, the regale, tabret, lute, violin, bagpipe, and trumpets. Below this range of figures are smaller panels, simply ornamented with the sacred monogram, the cross, and the crown, resting on a fine and richly carved cornice, which forms the base of the lantern. The groining of the octagon forms eight hoods, four above the windows, and four above the great arches of the choir, nave, and transept. Beneath these last are remarkable statues of the four Evangelists, about life size, seated in the attitude of writing, with a pen in one hand and a long scroll in the other; a writing table by the side of each figure, with the ink-horn attached to it by a strap, and another loop to hold the pen, is very complete. The space between the great arch and the groining of the choir is filled with rich tracery, on the central point of which is painted the Crucifixion, with angels holding the chalice and palm on the right and left. The long spandrils of the groining are painted with conventional scrollage of leaves and flowers in a style contemporaneous with the architecture. The monogram and crown of S. Etheldreda are found in several parts of the ornamental design. There were little or no available precedents for colouring found to guide the present work, when the woodwork of the lantern and octagon was cleared of whitewash; some remnants of red and blue were found in the hollows of mouldings, but exhibiting

“no principles of artistic arrangement. There was no ornamental coloured design anywhere, unless the sham gothic tracery on a green ground, which covered part of the octagon groining could be considered as such; the greater part of this being weak modern work was not thought worthy of repetition. An account of the painting of the whole of the woodwork, the colours used, and their prices, the names and wages of the chief workman, Walter Pictor, were found among the archives of the Cathedral. To judge by the colours the works must have been very rich; they were vermillion, orpiment, azure, verdigris, cynoper or dragon blood, red lead, white lead, gold color, and silver and gold leaf. This work was executed between the years 1335 and 1346. His wages were eightpence per week—‘*præter mensam et robam.*’ Oil is mentioned as specially purchased—‘*pro colore temperan*’—and solution of parchment was used as size.”*

Mr. Gambier Parry’s work has met with the most favourable criticism: and very properly so, for it is the result of cultivated genius and religious fervour, studiously striving to make art a teacher of Divine truth. Take for example the following as one of many gleams of his inner life it was my privilege to meet with in his quiet cathedral studio. Finishing a majestic figure of an angelic trumpeter on Christmas Eve, I think I see him, weary by toil, lay down his palette and brush, pointing to the panel with his maulstick, as he said, “There’s another hearty fellow blowing his trumpet as if he meant it. Listen to his note:—

“Hark, the Herald Angels sing
Glory to the new born King.”

This not being the description of a dock warehouse, railway-station, board-school, or other secular building, it must be right to add, in conclusion, when any toilworn man seeks a day’s holiday, let him go to Ely, and in that most glorious Cathedral (where all seats are free and unappropriated) let him join as best he can in chanting S. Ambrose’s grand old hymn, “*Te Deum laudamus.*” He will be refreshed for his future work by that foretaste of “the rest which remaineth for the people of God.”

The PRESIDENT.—There are several gentlemen here connected with the cathedral, who know it well by study and other means. I would particularly mention Canon Lowe, who may be regarded as the representative of the Dean and Chapter on this occasion.

The REV. CANON LOWE.—I feel quite unable in your presence, Sir Gilbert, and before the Institute of British Architects, to offer any opinions of my own upon this most interesting subject of the lantern of Ely Cathedral; but, I first of all desire to express on behalf of the Dean his regret that he is not able to be present this evening. In view of the further work which is contemplated by the Chapter in connection with this cathedral, I would say, it is to us a matter of the greatest satisfaction to find the attention of this important Society directed to questions bearing upon the restoration and re-construction of our noble cathedral. The very last thing, however, in my mind, would be to offer any theory of my own in the presence of such a Body as this, the more so, as Mr. Stewart, the well-known ecclesiologist and archæologist, who has studied Ely Cathedral for years, and whose book is regarded as a text-book on the subject, is, next to the President, most qualified to give information upon it. I would refer briefly, but most cordially to the author of the paper we have just listened to. Mr. Rowe is a most valued coadjutor with your President and the Dean and Chapter in the protection and preservation of the cathedral. Mr. Rowe exhibits on the walls, the drawings we

* An interesting series of essays upon the Monastery and Cathedral of Ely, by Mr. John Bacon, the Clerk of the Works, is in course of publication in “The Churchman’s Shilling Magazine,” beginning at page 385, vol. xiv.

see around us, and he has referred to them and the care with which they were made, but he modestly passed over the fact, which I think it only due to him to mention, that on the opening of the restored Lantern in June last, Mr. Rowe munificently presented to the Dean and Chapter the valuable collection of drawings now before you. The Dean and Chapter have expressed their thanks to Mr. Rowe for his most valuable gift, but I am glad of the opportunity of letting his liberality and care for the future welfare of the building with which he is officially connected be mentioned in a larger circle than we can command in our own locality, and before the audience best qualified to estimate its value. Mr. Rowe has stated that he prepared these drawings in order that we may in case of some catastrophe in the future, have records which will enable us to repair the loss. I trust rather that these drawings so carefully prepared, may never be called for for any such purpose, but may remain rather as records of his zeal, loyalty and piety, towards the building on which he has been one of the workers. Whilst, as I have said, I have no intention of offering any opinions of a technical kind upon the present occasion, I should be glad to mention that, under the guidance of Sir Gilbert Scott, the Dean and Chapter are about to continue their work of restoration, and to take in hand the rebuilding, or the completing of the exterior of the lantern of the cathedral so far as traces of its original character still exist. In connection with this, there are points which are debated in the diocese of Ely. With regard to the Dean and Chapter, we place ourselves with full confidence in the hands of Sir Gilbert Scott, the architect of the cathedral. Sir Gilbert Scott is aware, no doubt, that we are appealing to the public for subscriptions to carry out this work. We are asked questions, and various suggestions are made, some of which, no doubt, are valuable and worthy of consideration. Important points were raised in Cambridge the other day at a meeting of the committee: and, although when your President has matured his plans, I know I speak the full determination of the Dean and Chapter to place unreserved confidence in his skill and ability when his plans have been accepted by us, it is desirable, meanwhile, for the sake of meeting objections raised and questions asked, that public opinion should, as far as possible, be matured; and there are two or three points of this debateable kind which I should be glad to lay before this Meeting, and on which I should be happy, if in the course of the evening, members would be good enough to express their opinion. One of the questions which perhaps requires early consideration, is with regard to those angular turrets rising from the leaden portion of the lantern and surmount its crest; the question is started, whether or not these turrets should be crowned with wooden or other pinnacles. On this we have a difference of opinion, and it is a point on which our early decision must be arrived at: meanwhile, any expression of opinion on the part of this meeting will be extremely valuable. The second point is how far, taking into consideration the somewhat heavy and gloomy appearance which the lead-covered lantern presents to the eye externally, it will be desirable or not to enliven it by lines of gilding or similar ornamentation. Another and more important question remains for the future, and is not a matter for immediate decision, for even were our judgments clear on the matter, the necessary funds are not yet forthcoming. But it is a great question whether that lantern was by its great founder Alan de Walsingham, intended to carry some lofty *flèche* which should be a landmark over that great expanse of fen country out of which that noble pile emerges, or whether we should consider the lantern as we shall see it when its external ruin has been repaired, the complete and perfect realisation of Alan de Walsingham's mind. In connection with that would be the consideration of the form, whether of *flèche* like Amiens, or crown of the type to be seen at the High Church, Edinburgh, which such superstructure should take; and the practical question also arises, how far an addition placed upon that lead-covered lantern would be prudent, as adding to the weight which the piers below already carry; or again, how far a lofty *flèche* rising on that exposed country, subject to the violent gales which sweep in from the ocean, might subject the main principals of the

lantern to a strain which would endanger the safety of the whole fabric of the lantern. These are points on which there is considerable interest felt by ourselves, and on which we should be glad to gather information and materials for judgment. With regard to the last question there will be time for opinions to mature, and I shall only be too glad if a body like the Institute of British Architects should be able to help us in forming a good and correct judgment on a critical point of great importance, one which, if prudently carried out, might prove a beautiful feature which will raise the exterior of the Cathedral of Ely to a pitch of marvellous beauty, whilst within it exhibits a specimen of decoration which, thanks to Mr. Gambier Parry's labours, I believe to be almost unequalled in Christendom. The moot points on which we desire to be fully instructed at no distant date, are first, the question of crowning the existing lantern turrets with pinnacles, and the question of introducing gilding or other coloured ornamentation on the lead work which covers the lantern. I may add, that the Dean and Chapter, remembering the example which has come down to us from the days of Alan de Walsingham, and has been so nobly imitated by Dean Peacock in recent time, are not unmindful of their own responsibilities. We look forward to works which may, indeed, go on for years, and which whether we are spared to witness them or not, will make Ely the boast and glory of East Anglia. I beg now to express in the name of the Dean and Chapter our high sense of the courtesy of the Institute in inviting us to be present, and to state in my own name the great pleasure I have had in attending this Meeting, in company with so many men distinguished in art, and in listening to the Paper which has so deservedly occupied our attention this evening.

The PRESIDENT.—I may mention that this great work at Ely was carried out under the superintendence of an architect, who was for twenty years sacrist in that cathedral. During the time he held that office, he devoted himself with extraordinary zeal and talent to his work, and to his guidance we are indebted for many of the most beautiful works of the cathedral. We are favoured with the presence to-night of a direct successor of Alan de Walsingham, the Rev. Mr. Stewart, who, when I first knew him, was also sacrist at Ely, and devoted his special attention to the works of his predecessors. During the last few years he has brought out an Architectural History of Ely Cathedral, perhaps the most admirable work of its kind that any one with the exception of Professor Willis (whose friend and disciple he was), has produced, and I am sure we should all be most glad to hear anything he can tell us about this cathedral.

Rev. D. J. STEWART.—I beg to thank the President for the kindness with which he has spoken of me. All that I have done has been to describe the chief features of this work to the best of my ability, but I feel that I am not in a position to give an opinion as to what should be done in the future. I came to listen, and I confess I am not prepared with any suggestions, and I must leave it to those who are more competent to consider what is best to be done.

The PRESIDENT.—We have amongst us this evening Mr. Burges, who knows as much of this cathedral as any man, and I may mention that I first made his acquaintance in that cathedral twenty-seven years ago, I think.

Mr. W. BURGES, Fellow.—Of course, I need not say I take great interest in this subject, as I spent three months in studying this cathedral. I wish to ask two or three questions. Mr. Rowe talks about going down to the rock. Where is the rock? how far down? and where does it lie?

Mr. ROWE.—It is hard sandstone, so hard that it cannot be worked with tools at an economical price, and it is found at a depth of something about 6 feet. Mr. Burges.—And they did not take the trouble to go down to it? [Mr. Rowe.—They did not at first]. Mr. Burges.—Did Alan de Walsingham? [Mr. Rowe.—Yes].

The PRESIDENT.—I may add to that information, that having seen the rock, and owing to the

settlements which have taken place through the increased drainage of the town, I had to examine the foundations, both of the older part, and also that erected by Alan de Walsingham. I found the Norman and early English parts went down to what they thought was the rock, but it was only a thin bed of stone, beneath which was a stratum of softer material. Alan de Walsingham removed that thin bed and went down to the main rock some feet below.

Mr. BURGESS.—How thick are the joints of the masonry? [Mr. Rowe.—The joints are as fine as the joints of modern masonry]. Mr. Burgess.—About the paintings. I remember when I was studying this cathedral, Sir Gilbert Scott was beginning to take away the whitewash from the wooden vaulting of the lantern, and some of the spaces between the ribs had dark green tracery. That struck me as being old work. [The President.—It was old work, no doubt]. Mr. Burgess.—Mr. Gambier Parry's decorative work is very beautiful, but I am rather surprised that so eminent an ecclesiologist should have violated one of the first laws of iconography, by painting his angels with coverings on their feet. Angels are God's messengers, and are represented barefooted and with wings. The angels of the Old Testament up to the time of the Babylonian empire have no wings, whilst the angels under the Christian dispensation have wings as an emblem of celerity; the Greek angels have sandals, but not shoes. I am sorry these matters should not have been observed by Mr. Gambier Parry.* Then there is the question of the colouring of the lead of the roof. I am inclined to think that too much gold on a roof, until it is toned down, or some of the gold washed off, is too garish, and looks too much like a toy; but in France, and also in England, there are one or two examples of the lead being decorated by tinning it with figures, coloured on the end. I would suggest whether tin, with a judicious amount of gilding, would not lighten up the work without making it so garish.

The PRESIDENT.—You may see the same thing in Cologne Cathedral, although it is almost obliterated, but going over the roof one sees the lines were decorated with very rich designs in tin, which must have had a very beautiful effect.

Mr. BURGESS.—I have myself used decoration of that description, but not in figures. The next point is as to the lantern being surmounted by a spire. We have no records about this, and as Pugin says, "every ecclesiastical tower up to a certain date was intended to be capped by a pointed roof or spire," I think that is not a question of archæology, but a question of architectural taste. You have an architect, and you must trust to him. I might differ from Sir Gilbert Scott, and he might differ from me; and the architect must have the credit or reproach of it. I am quite sure if you trust to the judgment of our President in this matter you will be quite safe, but that does not preclude the expression of opinion. I would suggest that the proper way to test the thing, would be to have a suitable model of the cathedral made, and try it with spires and without spires; that perhaps is the only way to do it. Before I come to the last point, I would say, we heard in the paper, that it is intended to fill some of the empty niches with stone figures, at a cost of £20. each. [Rev. Canon Lowe.—I have not heard of them till this evening]. Mr. Burgess.—I would certainly suggest caution in that respect. I want to ask the following questions: suppose we had to do this work again, how should we do it? Should we do it in fir, which is what we use now, or should we do it in oak; whether it would be better in oak, and would it last longer? Does not oak twist and turn, which deal does not? and will not our modern construction in deal (supposing you have proper scantling) with iron, last as long as construction in oak? In the first place deal does not warp and twist; in the second place, it is lighter; and in the third place, you can use iron, which you cannot do with oak, because the gallic acid acts upon the iron. When oak is used, I have invariably found a piece of painted paper placed underneath the wood, and every means was taken to isolate the iron from the oak. But I should

* Representations of angels with shoes are to be found in Mrs. Jameson's "Monastic Orders," and Viollet-le-Duc's "Dictionnaire raisonné," also in the Louvre.—R. R. R.

like to know when deal first came into general use, and secondly, how it stood. I have never been able to find that out. What is the earliest roof, has it much iron in it, and has it stood well? The fact of the matter is, you cannot use oak, because it is too expensive and warps.

Mr. WYATT PAPWORTH, Fellow.—I beg to propose the warmest thanks of the Meeting to Mr. Rowe for this interesting and valuable Paper, and for the exhibition of these drawings, which are in themselves quite a lecture. With regard to Mr. Burges's question about fir, I would refer him to a paper which was read here about twenty years ago. I do not myself recollect much upon the point which he mentions.

Mr. C. FOWLER, Fellow.—I do not rise to make any observations upon the paper, but to second, as I do with great pleasure, the proposition of Mr. Papworth, that our cordial thanks be given to Mr. Rowe for his able and excellent Paper. The particular reason for doing so is to express to him again the great thanks of myself and others for his kindness in taking us last summer over this structure, which makes the Paper the more interesting to me. Mr. Rowe devoted considerable time in taking us all over this work; he showed us the drawings and explained everything in the kindest and most complete manner.

Mr. C. F. HAYWARD, F.S.A., Fellow.—As one who had the pleasure of inspecting this cathedral on the occasion referred to by Mr. Fowler, I cannot help saying a few words in the same spirit. I was thankful to have the benefit of inspecting these drawings in the cathedral itself, and to hear Mr. Rowe's explanations of them. It is impossible for anyone who takes a holiday to do better than follow the suggestion Mr. Rowe has thrown out—that is to go down to Ely and spend some days in wandering about this building, and let him not fail to go up into one of these turrets, and in and out amongst the timbers, that he may instruct himself as to their construction. I wish to express my sense of the kindness of Mr. Rowe, and to bear my humble testimony to the readiness with which he affords explanations to all who apply to him.

The PRESIDENT.—If no one else wishes to offer any observations, I think I must add my own personal thanks to Mr. Rowe for the very admirable manner in which he has elucidated the construction of this extraordinary feature of the cathedral. I would also express my gratification united with some personal humiliation at seeing he has performed so nobly what others ought to do who are engaged in works of restoration—that is, the preparing perfect drawings when he had the opportunity, and when he was brought into close contact with the work by means of the scaffolding, and whilst his whole spirit was directed to the work. We ought all to do this. We all think of doing it but sometimes we do not. If we did, it would form a record of the present state of ancient buildings, which in future time would be invaluable. In this case, however, it has been nobly done, and I hope it will remain for ages to come in Ely, not only as a record of what has passed away, but as a record of his industry and high determination, so that the memory of this great work may not be obliterated by any untoward accident. We have had a good deal brought before us of late about workmen architects. I think we have here before us a proof that the use of the term “workman” did not in the middle ages convey the idea of a person belonging to the uneducated classes of society. I am not aware whether anything is known of the birth or family of Alan de Walsingham, or when he entered the Abbey of Ely. He is first mentioned in the year 1314. He was then probably only a monk, but he successively passed through the offices of sub-prior, sacrist, and prior, and was eventually elected as Bishop of Ely, though the election was cancelled by the Pope; and yet this man is termed a “workman”—his epitaph calls him “flos operatorum”—so that we have distinct proof that the word “master workman” did not refer to a man belonging to an order inferior at all to what applies to the members of our profession. In every sense Alan de Walsingham must have been a gentleman, and a high-class gentleman, or he would not have been elected bishop. This great work I think is the strongest proof we have of

the originality of his genius, but it was by no means his only work. It would appear that only those works in the cathedral are generally ascribed to him by historians, which were paid for out of the abbey funds, of which he was the guardian; but there can be no doubt he was architect of other great works carried out by bishops and prior or from other sources. I think that we may conclude that he not only built this great octagon, but also those three magnificent bays in the presbytery which are attributed to Bishop Hotham (because he paid for them), and which are amongst the most beautiful specimens of the "decorated" period of architecture which remain. Their beauty, I should mention, is enhanced by two facts: the original Norman structure, which had a gallery second only in size and height to the arcade beneath, was continued in its full proportions in the early English work by Bishop Northwold towards the east. The central tower, by its fall, destroyed the Norman bays of the Sanctuary, and Alan de Walsingham continued the same lines back again from Northwold's work, but in the decorated style. I think the design of the bays is the most beautiful that can be imagined, being the richest Middle Pointed, but with Norman proportions. We know that Alan de Walsingham laid the first stone of the Lady Chapel, and probably designed and superintended the building of it; and I believe the same may be said with regard to the beautiful Chapel of Prior Crawden, so called because it was built for and paid for by him. One proof that Alan de Walsingham built this chapel is derived from the fact of certain niches in it being counterparts of those in the octagon. Then amongst the minor works executed by him may be mentioned the so-called monument to Bishop Hotham, proved by Mr. Burges to have been really the sub-structure of the Shrine of St. Etheldreda. In other works also his hand may be traced, so that he may be viewed as the general architect to the cathedral and abbatial buildings for a period of more than forty years. He was twenty years sacrist and twenty-three years prior of that cathedral. We have, therefore, in him an example of a mediæval architect of the highest talent, and at the same time holding the highest rank which a gentleman of that age, who had devoted himself to an ecclesiastical life, could hold. It is interesting to read of his laying the foundations of these eight piers,—his omitting the four piers of the central tower and by stepping on to the next piers,—his erecting an octagon instead of a square, and leaving the whole centre of the church open. That idea had been anticipated by the architect of the Cathedral of Florence. Whether Alan de Walsingham knew of this we cannot tell; at Sienna, also, it was, made use of in a modified form, and that work was later than that of Ely. The most remarkable parallel case, however, that I know of is the octagon of the Church of St. Petronius, at Bologna. This was never completed, but is known by an ancient model, preserved in the church, which shows almost a counterpart of this work, though fifty or sixty years later, so that if Alan de Walsingham took his idea from Florence, this later Italian architect must have followed Walsingham more exactly than he followed that of Florence. With regard to the use of fir, I think we ought hardly to expect that it would last so long as oak, though even in this country it will last a long time. The roof of the Cathedral of Old Aberdeen was built of Scotch fir about the year 1520. It was much decayed and though quite susceptible of reparation, was needlessly destroyed within the last few years. [Mr. Burges.—Was it painted?] The President.—It had a painted ceiling under. In Italy and Germany fir was extensively used in mediæval works, and in Norway it is found of Romanesque date.

Mr. BURGES.—Fir was greatly used in joinery. In accounts of the time of Henry III. reference is made to the king having a gallery made of fir.

The PRESIDENT.—With regard to the question whether the architect intended any *flèche* beyond what exists, I would say when we were repairing the timbers some twelve or thirteen years ago, we traced the very same carpenters' marks on the timbers of the octagon from its very base to the flat roof

of the lantern. On the latter there was no kind of mark of any spire having been intended, so that if he ever had it in his mind he gave up the idea. There were no pinnacles at any late period that one knows of on these turrets. The lantern of the centre tower of St. Margaret, at Lynn, appears to have been a copy of that at Ely—and in a 17th century print its turrets are shown like those at Ely. The octagon fell down two centuries ago, but is shown by old prints without a spire. It had no surrounding octagon, but simply covered the central tower.

Mr. BURGESS.—Could the architect have intended an open-work spire?

The PRESIDENT.—If he intended anything I conceive it would be flying buttresses, meeting in a point, but I think not a spire. I will mention that the oblique position of the lantern groining arises wholly from the outer octagon being of unequal sides—a regular octagon placed in the middle of an irregular one. The changing the direction of the two octagons is a necessity of groining, as may be seen by examining an old Chapter House. We have innumerable proofs of the high opinion in which Alan de Walsingham was held in his own time. I think at no period from that time to the present has his fame in the least diminished, and I am glad to be a witness to the celebrity of his fame on this occasion and in this Institute. I have now to convey to Mr. Rowe our hearty thanks for his great kindness in giving us this paper.

Mr. ROWE.—In acknowledging your kind vote of thanks, I will not trespass on your time at this late hour. Reference has been made to the very agreeable visit I had last summer from a dozen architects, for the most part, I believe, members of the Institute, and I can only say I should be most happy to receive a similar party in this and succeeding years, and it will give me very great pleasure to facilitate their inspection of the cathedral, and to give them all the information about it which it is in my power to afford.

The vote of thanks to Mr. Rowe having been carried by acclamation, the Meeting adjourned.

SIR GILBERT SCOTT'S REPORT ON THE LANTERN OF ELY CATHEDRAL, 1862-3.

(Taken from a rough draft.)

GENTLEMEN,

In submitting to you the accompanying design for the restoration of the central lantern of Ely Cathedral, I beg to offer a few remarks in explanation of the same.

As you are well aware, the great central octagon, which renders this church unique among English cathedrals, was the work of the celebrated clerical architect Alan de Walsingham, after the fall of the Norman central tower in 1322. It is a work displaying extraordinary originality of conception and skill both in design and construction.

This noble work is terminated by the lantern now under consideration, and which, though there can be no doubt that it originally harmonized in beauty with the rest of the structure, has suffered so much as to its external design from the repairs it underwent in the last century, added to what it may already have lost by decay and minor reparations, that it is at present very far from being in harmony with the structure on which it stands. My great object has been to ascertain as nearly as it is possible how far its original design differed from what now exists, and generally to recover as far as may be its true character. The evidences we have to go upon in this inquiry are those offered by the existing remains, those to be obtained from old prints and notices, and such arguments as may be drawn from corresponding works. The lantern consists of two stages; the lower one, or lantern proper, being open to the church and surrounded by eight windows of three lights each, and covered internally with timber

vaulting, and the upper one being an attic or loft, of some ten feet high, between that vaulting and the roof. From the structure itself we find that the windows of both stages have been renewed,—that those of the lantern proper were originally of *four* instead of *three* lights and of rich tracery instead of intersecting plain mullions,—that the roof of the great octagon, out of which the lantern rises, has been raised several feet against its sides, thus in all probability shortening the windows in a corresponding degree,—and that the minor filling in of the sides of the upper story—including the upper windows—has all been renewed; and, finally, that the lead work and all external features have been renewed and entirely altered. A question has been raised by a gentleman who has taken great interest in the subject [Mr. Styleman Le Strange, since deceased] and who is a great benefactor to the cathedral, and whose views on these and every other ground claim every consideration, whether the upper story is not entirely an addition of a subsequent date; and, acting upon that supposition, he has drawn out a very ingenious scheme of conjectural restoration. After very careful investigation, however, I am quite convinced that this view is untenable. In the first place, on a merely *primâ facie* view of the case, as taken in connection with the very numerous instances of timber turrets in the centres of churches, which we find to have always been erected for the reception of bells, one would naturally be led to expect that they would be provided for in this instance. Secondly, in an early notice of the lantern by Fuller in his “Worthies of England,” he says, “The lantern thereon built by Bishop Hotham . . . is a masterpiece of architecture. When the bells ring, the woodwork thereof shaketh and gapeth (no defect but perfection of structure) and exactly chocketh into the joints again; so that it may pass for a lively emblem of a sincere christian, who, though he hath *motum trepidationis*, of fear and trembling, stands firmly fixed on the basis of a true faith.”

These bells were probably removed during the civil wars, for at the time of Essex's survey in 1757 they were not there though the frame which had formerly received them still remained. He mentions this in his report, as follows:—“And that the old bell, frames, and other lumber, be taken out of the lantern.”

It has been suggested that though this attic story existed as early as the time of Fuller, it may nevertheless have been of a date subsequent to the original erection of the lantern. I find, however, no evidence in favour of this conjecture, but much against it.† In the first place, the eight enormous trees which form the angles of the lantern run up into the belfry storey, some of them to its extreme height, and others which were too short are pieced in a systematic manner, as if originally to bring them up to the required length; secondly, these upright timbers are morticed systematically to receive the filling in timbers which formed the sides, and tenoned with the horizontal plate which receives the roof, which is itself very systematically worked for the filling in timbers: thirdly, the roof timbers are distinguished by *carpenters' marks*, which tally with those on the main uprights, and are of the same kind with those found on the timbers of parts which are indisputably original. From these evidences, I am convinced that not only is the belfry storey part and parcel of the original design, but even that the roof is original: indeed that the alterations which the lantern has undergone are limited to its windows and external details. Taking a general view of the design of the lantern, aided by the two views of it given by Browne Willis about 1742, that given by Bentham, which was taken in 1764, though not engraved till after the alterations made by Essex.† I have come to the

* The date, size, and names of the bells are not known. The worn holes for the ropes were found among the timbers, and tracing down the oblique line of two of these, the iron hook was found in the stone pier below, on which it was customary to hang the rope out of the way.

† I should rather have said, “dated 1764, though taken before Essex's alterations.”—G. G. S.

conclusion that it was to a certain extent an imitation of the general form of the stone octagon below it. Each has large windows of four lights below, with circular panels in the spandrels; each had a distinct storey over these windows lighted by smaller windows consisting of several detached lights; and each had considerable turrets at the angles, and in all probability open parapets between them. The chief distinction between the two designs would appear to have been the subdivision of the windows of the belfry storey into two heights by a transome, as is shown in the old views, and is confirmed by the mortices still remaining in the angle posts.

This analogy is established equally by the old prints and by existing remains, so that, in my mind, there does not remain a shade of doubt on the subject. It is true that the old views are carelessly drawn and that discrepancies exist in them, but they establish the general outline and aspect of the lantern, at the time they were taken, beyond all room for doubt; and, as the existing remains furnish evidences agreeing with what these views would suggest, and as these evidences are further confirmed by the carpenters' marks which show them to be original, there seems to me no question that the general aspect shown in the views is in the main that of the original structure though the details are left in a great degree uncertain. As one instance of what I mean, I will mention the angle turrets of the lantern. These were entirely altered by Essex, so that if the old views had not existed, we should have had some difficulty in conjecturing their form. The old views, however, show them to have been on a square plan whose diagonals coincided in direction with those of the octagon. In this the views of 1742 and those of 1864 agree. Now, on examining the existing work, we find mortices in a very peculiar glancing position in the flanks of the great angle posts of the lantern, and, on comparing these with the views, we see at once that they are exactly suited to receive the framing of the angle turrets there shown. Again, in the views we find the lights in the belfry storey to reach up to the cornice and to be terminated in small arches as those to the stone octagon below; and, on examining the under side of the upper plates, we find a series of mortices which would exactly suit this, the mortices being alternately single and double, just as would be necessary to receiving the mullions and arches of such window work.

I have, in the accompanying sketch, endeavoured to embody the results of the evidence I have alluded to, filling in the details as I judge most likely. The old views show the turrets to be finished with battlements, but I think it probable that from these, lofty pinnacles would have sprung—that being an arrangement frequent at Ely—beginning in the work of De Luda and continuing through that of Walsingham. The parapet I have supposed to be like that of the octagon below. It would render the whole far more perfect if the roof of the octagon were brought down to its proper level, so as to open out the whole height of the windows; but, if this cannot be, we must modify the design so far as is necessary. It will be also a question whether the small gallery which has been added round the interior for the purpose of getting at the windows for reparation should be retained or not. The internal decoration and the filling in of the windows with stained glass* would, I presume, form a portion of the work, and on the designing of the decoration I trust we might have the advantage of the advice and experience of Mr. Le Strange. It will be a question, in this, how far the design of the old decorations should be adhered to.

* The funds did not allow of either of these works being carried out at the time. As the windows *must* be glazed, they were filled in with temporary glazing with a rude aim at a slightly ornamental character by the local glazier. The decoration has eventually come into the hand of Mr. Le Strange's friend, and the voluntary continuator of his work, Mr. Gambier Parry.

Royal Institute of British Architects.

At the Ordinary General Meeting of the Institute, held on Monday, the 17th January, 1876,
H. CURREY, Vice-President, in the Chair, the following Paper was read:—

THE NATIONAL SAFE DEPOSIT COMPANY'S PREMISES, MANSION HOUSE, LONDON.

By J. WHICHCORD, Vice-President, F.S.A.

IN compliance with the request of the Committee on Sessional Papers that I should prepare a short essay for the Institute upon the building which I have recently constructed in the City for the National Safe Deposit Company, I desire to preface my remarks by disclaiming the egotism that might be imputed to me in drawing prominent professional attention to a mere architectural work, but as the purpose to which the building is to be applied is entirely new in this country, and as the process of excavating for its foundations has brought to light some interesting relics, and the construction of the edifice has involved the adoption of some novelties, I venture to hope that a brief descriptive history of the work will not be without interest to the profession.

The problem which the Company undertook to solve, was to provide a receptacle in the heart of the City of London, that should be proof against fire, burglary, and riot, in which property small in compass, but of great value, might be safely deposited by many individuals. I am anxious at the outset of my remarks to acknowledge the great advantage I have had in the advice of several eminent scientific men, who were consulted by the Company upon various special and technical parts of the work, in order to render the construction ultimately determined upon as perfect as possible, and whose suggestions were adopted where they were found to be practicable, little restriction being imposed upon me on the ground of cost, the great aim being to make the place "*invulnerable*."

The movement for the establishment of Public Safes originated some years ago in America, and was very largely developed there after a series of extensive and calamitous conflagrations in many of the principal cities. The idea was further strengthened by a series of well planned and daring burglaries which occurred about the same time, and proved in a very practical and costly manner how insecure the existing vaults and ordinary strong rooms were, when attacked by a large fire or by skilled force.

The American system of Bonds payable to bearer, with coupons upon them, in which way a large part of the property of the country is represented, presents just the most attractive booty to a burglar to possess, and the frequent loss of such documents from fire and theft suggested the absolute necessity of making provision for these, and kindred articles of small bulk and great value. The subject was comprehensively considered, and it was then realized how stupendous the amount of such securities was in even the smaller towns, and how inadequately they were protected and cared for, and almost simultaneously "Safe Deposits" were established in New York, Boston, Pennsylvania, Chicago, and other of the more important Commercial Cities of America.

During the discussion upon the subject, one of our greatest Cosmopolitan financiers commenting

on the immense accumulated wealth of the world and the reckless disregard of caution on the part of its owners in taking care of it, remarked that "of the vast mass of securities which represent that enormous wealth, he was persuaded not above *one tenth* was well-guarded."

It has been generally supposed that existing Banks in which many securities are deposited are safe and sure repositories, but in addition to the admitted fact that a banker is in no way responsible for the safe custody of deposits, the construction of ordinary bank cellars is rarely such as to withstand a general conflagration or the attack of skilled burglary. As it is not generally known how systematically and laboriously some of these bank robberies have been planned, I have thought it worth occupying a few minutes of your time, to relate the coolness and impudence displayed in one or two recent cases.

One of the boldest and most skilful of American bank thieves, who was recently convicted, accomplished his task as follows: he simply walked into the bank, put a pen behind his ear and approached one of the safes in the back office in the presence of one of the directors. This gentleman thought from his actions and appearance he must be one of the clerks of the bank and paid little regard to his movements. The thief abstracted an immense amount of valuable securities, removed the pen from behind his ear, and made off with his booty.

A more scientific attack on the National Bank at Pittston, Pennsylvania, is described in the newspapers of last November. The roof of the building was gained by means of ladders. The Bank roof was covered with tin, and it required much caution to proceed over it without arousing the occupants of a room in the house, the window of which opened directly on the roof. But over it the burglars passed without disturbing any one, and selecting a spot about 8 feet from the window, and about 4 feet from the front edge of the roof they carefully removed a portion of the tin, putting heavy clods of putty on the places where they had cut. After this they made a large hole in the roof, which admitted them to a low attic over the top wall of the bank. Along this they crept until they arrived at a point just over the centre of the brick arch of the bank vault, and here they commenced operations again. Their work must have been very rapid, but it was entirely successful, for they managed to make a hole 2 feet square through the 15 inch brick arch. The *debris* was thrown on one side, but in such a position as not to interfere with a ready passage from the vault to the aperture in the roof. The opening once made, a fine rope ladder left by the thieves was let down, and in this way the floor of the vault was gained, a distance of about 8 feet from the top of the arch. The vault contained, besides the books of the bank, 3 spherical safes, which were stationed at the end opposite the doors. A gas jet was suspended in the centre of the vault and this the burglars lit to enable them to proceed with their work. A hole was drilled into the lock of one of the safes, and this it is supposed was charged with nitro-glycerine. A fine linen cord was then made fast to an electric fuse attached to the charge, and this cord was made to run through small screw rings placed in adjacent shelves, and so carried on to the roof from whence the shot was undoubtedly fired, since it would have been impossible for any person to have withstood the concussion caused by the explosion in the vault itself, as was shown by the inner door of the vault, which was bent nearly double. This latter was made of $\frac{1}{2}$ inch iron. The presumption is that after the explosion the burglars descended to the vault and ransacked the contents of the safe which had been successfully blown open. An alarm being given, the manager was aroused, and when he got to the spot he was confronted by a man who leaped from the ladder, who in turn was quickly followed by another and still another, the latter having jumped from the roof. An alarm was raised, but the thieves made good their escape before assistance arrived. In the sudden flight of the burglars they were compelled to leave almost all their paraphernalia such as jemmys, screws, bits, braces, fuses, bar iron, putty knives, rope ladders, and skull caps. One of the latter was an elaborate affair, woven of the finest silk and of many colors. All the tools left behind gave evidence that none but the most skilful professionals were engaged in the robbery.

Similar attacks were successfully and systematically carried out at several other banks, of which those of the Ocean Bank of New York, the Boylston Bank of Boston, and the Bank of Baltimore are prominent instances. They were all committed in the same way, viz. by forcible entrance through the walls of an adjoining building, and six or eight times at least, bank vaults in America have been so penetrated, and in every instance the thieves have got off with their plunder, proving to demonstration that it is perfectly practicable to enter a vault by this means. When the Ocean vault was robbed the Directors were determined, if possible, to avoid a repetition of a similar disaster. They therefore bought an enormous safe and placed it in the centre of a specially constructed office with lighted passages all round it, and guarded it by watchmen night and day, which effectually prevented a similar attack being made.

Special buildings, afterwards erected for the deposit of bonds and kindred securities, were from time to time made of greater size and more elaborate strength, and of these the Mercantile Loan Company's premises at New York are of the most perfect of these buildings. It will be seen, however, by reference to the plan, that this establishment is after all nothing more than a very large iron safe protected against fire by being placed in a fireproof vault, and against burglary by an enclosure of iron in various combinations. Much reliance has been placed upon the use of *spiegeleisen* and other material supposed to be proof against the operation of drilling, while the doors are superior bank safe doors with very elaborate and complicated locks and bolts.

Such being a general history of the movement in America, it occurred to some leading financiers in London to consider whether there was not a similar demand in this country, and although the system of negotiable securities is not so general here, it was found on enquiry that hundreds of millions of such valuable documents are floating about in this metropolis, increasing by millions sterling every year, and all more or less exposed to loss by fire or robbery.

The National Safe Deposit Company having been formed to take charge of such valuable documents as well as of deeds, jewels, and in fact of any valuable property of small compass, the directors at once set about ascertaining what was the best means of providing "*absolute security*," which I venture to hope you will admit is realized in the new building adjoining the Mansion House, the prominent features of which I am now about to describe. In designing the structure, four principal objects had to be borne in mind :—To construct a building that would provide ample accommodation to depositors ; to give undeniable security against fire ; to offer a defence not only against thieves but also to anticipate the extreme case of a general riot or attack ; and to make a citadel which would resist the combined attacks of a furious mob for a considerable period of time.

The London Company having regard to the extended sphere of operation with which they had to deal, determined to construct a very much larger establishment than existed in America, and it would have been impracticable to have followed the American model on the score of outlay, time in manufacture, and manipulation. It was found necessary to design a perfectly undrillable armour-plating in place of laminated iron-plates, as well as to invent a simpler contrivance for the numerous doors into which the Sanctum Sanctorum of the larger conception had necessarily to be sub-divided.

The first difficulty to be encountered was a suitable site ; for while it was essential that it should be in the centre of the City, it had also, if possible, to be detached from other buildings on all its sides, so as to prevent the possibility of intruders working away at its external walls from adjoining property. After much search and consideration, the site in question was selected, as it possessed the great advantage of being surrounded on every side by public streets.

The excavation for the vault in which the Safe proper is constructed, involved the necessity of going to the very unusual depth of 46 feet below the level of the ground, and from the nature of the

soil, and the great lateral pressure of the surrounding earth, the work had to be executed with very great caution. The soil was loose and treacherous, in fact to a depth of about 30 feet it was made earth or debris, at which point the London clay was reached. A part of the surface disclosed thin beds of gravel and indications of water-courses, and in those places a considerable quantity of water was encountered, which, I have no doubt, is a rivulet running in its old course; the water in question is made use of as the first line of defence to the outside walls of the vault, or Sanctum Sanctorum of the building.

During the progress of the excavation of the site a very interesting collection of Roman antiquities was discovered, not only interesting in themselves, but by their level and position indicating the topography of Ancient London.

These remains were unearthed at a depth of from 18 to 24 feet below the present surface of the street, and with the co-operation of my friends, Messrs. J. E. Price, F.S.A., and Alfred White, F.S.A., they have been carefully arranged, illustrated and described, and are now deposited in a case at the Company's premises. The date of the Roman remains is given by the coins that were found with them, they have been carefully examined and collated by Mr. C. Roach Smith, F.S.A., the eminent numismatist. They all belong to the best period of Roman History, ranging from Claudius to that of Antoninus Pius; no coin of later date having turned up, while between these periods the chronological sequence is unbroken. This abrupt cessation suggests that the site formed part of the first Roman settlement in London; most of the relics found at the extreme depth of the excavations are as early as the second century after Christ.

The collection of antiquities is very various and miscellaneous in character, consisting of an immense quantity of pottery, and a large portion is of the bright red glazed ware, commonly known as Samian, interesting from its decorative character and the names of the potters upon the specimens. There were also many lamps, mortaria, and earthenware objects to which we have been unable to fix a use, also a large quantity of metal knives, nails, chains, styli in great variety, many of them well preserved and highly decorated, and a choice variety of fibulæ, keys, and female ornaments, bronze egg spoons with sharp ends, querns or millstones, &c., all of which are now in the possession of the National Safe Deposit Company, and are open to inspection at their offices.

Although a fair and excusable opening tempts me to enlarge upon some of these interesting relics, I forbear to do so except as regards an "arca finalis," or boundary mark of the Agrimensors or Roman land surveyors, which being a very rare discovery relating to a subject interesting to antiquarians, I will briefly refer to. At a depth of about 30 feet in the Charlotte Row trench a framework of oak was found, about 3 feet square, having the appearance of a box, the sides formed of planking, $1\frac{1}{2}$ inches thick and about 8 inches wide. The position in which it was found was palpably at the side of an old water course, being immediately beneath some piling of which there was a great quantity round about it. It was at a lower level than the debris and made earth, which contained the Roman articles, and it was evident it had been placed where it was found with some special object, and did not come there by accident.

After consultation with some antiquarian friends, a very careful investigation of the vicinity was made, when the clay within the framework was found to be puddled, whereas the natural clay around it was undisturbed. The puddling, which was about 2 feet in thickness, contained a quantity of valueless pottery, of great variety and quality, including a fragment of red Samian ware, the whole of which was, however, unquestionably Roman in date. It was evident that these valueless Roman fragments had been placed within the framework for some special object. At a distance of about 5 feet from the above a perfect amphora of large size was discovered, with the stamped word "Cuavis" upon one of

the handles. This amphora was in an inverted position, was artificially sunk in the clay, and was evidently associated with the wooden frame and its contents.

I am advised and convinced that these relics are those of a true "*arca finalis*," or boundary mark used by the Roman surveyors as a point of demarcation of property. Such marks must have abounded in all Roman cities, but they are not easily identified, and have doubtless been frequently laid open and passed over without attracting notice. In this case the rough framework and the valueless pieces of pottery presented little to arrest the attention of a casual observer, and nothing whatever to excite the cupidity of the excavators. These *arcæ* are, however, monuments of infinite importance, defining, as they do, boundaries of public or private properties, and appear to have excited more attention upon the continent than in England up to the present time.

An *arca* may be shortly described as a mark or sign of a Roman land surveyor, which he placed at points of junction of land—"trifinia" when it occurred at a junction of three, and "quadrifinia" when of four points. It does not appear *arcæ* were of any precise or conventional description, but were very much left to the pleasure and discretion of the individual surveyor or agrimensor. They had, however, certain general features: they were to be more or less buried, and contain certain specified typical objects, such as coins, pieces of glass, bones, pottery, or metal. In this country the majority of the examples that have been identified, have been formed of timber containing the relics, and associated with some perfect object in its near vicinity. The discovery of such a state of things would always indicate a Roman boundary.

It would be a highly interesting subject to digress from the text of the paper to an investigation of, and comparison with, the few cases in which these Roman marks have been discovered. I leave that, however, for some more able archæologist, and return to the more precise matter before us.

The great depth at which the foundations had to be put in, and the treacherous nature of the soil—the narrow street of Bucklersbury bounding it on one side (only about 17 feet wide) together with such important buildings as the Mansion House and the Church of St. Stephen's, Walbrook, immediately adjoining it—dictated the necessity that great precaution should be used in getting in the foundation walls, which was done in trenches, in short lengths, with the strutting as shown upon the drawing exhibited. The external walls are built in very hard brickwork, in cement, with a backing of hydraulic concrete, of an average thickness of 6 feet. After the enclosing walls were thus laboriously got in, and brought up to the level of the ground, the earth within the enclosure was taken out by means of moveable steam cranes, and a cross wall was built to prevent the possibility of bulging from the great lateral pressure of the earth.

A chamber, or vault, 80 feet long, 46 feet wide, and 45 feet high, was thus secured, within which to construct the Sanctum Sanctorum, it will be observed upon the illustration that the latter is a distinct and insulated structure within the vaults, enabling the Company's officers to patrol it externally on all its sides, as well as underneath it.

The walls of the great safe within the vault are 3 feet in thickness, built of extremely hard blue bricks with an outer skin of firebricks. The brickwork being intended mainly for protection against fire was not considered sufficient defence from burglary or riot, for although it was found to be a work of great difficulty to cut through it, there was no absolute obstacle to such a thing being done. A distinct lining of undrillable armour plating was therefore provided within the brick walls, which thereby ensures security against drilling and smashing.

The armour lining of the best American safes consists of several thicknesses of steel and iron, with *spiegelheisen*. Although this sort of construction may be suitable, and include all that is required in safes

of comparatively moderate size, its cost would have been too burdensome in this instance ; besides which, a very considerable time must have been occupied in its preparation and fixing. A method of construction for the lining was, therefore, contrived by Messrs. Eastons and Anderson, and myself, which gave all the required advantages, with a considerable saving in cost and time, as compared with the more usual method. It has been made the subject of a patent belonging to the Company, and consists of cast iron plates, chilled on one side, with strong wrought iron bars, crossing each other at right angles, imbedded in the casting. These plates were made of convenient size, and fastened together with strong ribs of wrought iron in such a manner as to be thoroughly secure. Experiments were made upon several of the plates, and it was found that although repeated strokes of two sledge hammers, wielded by powerful smiths, were able to crack them, it was impossible to extract a piece of iron of any considerable size, on account of the interlacing wrought iron bars, which no smashing or hammering that could be brought to bear, would break. Drills were also tried upon the plates in vain, as the chilled iron effectually resisted their action.

The doors, of which there are thirty-two — one to each of the thirty-two compartments into which the vault is divided, became a very serious item of consideration. It is manifest that the strength of a fortress is only equal to that of its weakest part, so it is essential to make the door of a safe as strong as the rest of the enclosing space. It is evident that the adoption of an ordinary bankers' safe door would not be an adequate protection in this case ; in addition to which, the extremely complicated character of the locks of all such doors, their great cost, the time that must be taken to manufacture such a number, and the daily inconvenience and labour in opening and shutting them, dictated the necessity of something much more simple. The doors which have been adopted are placed one over the other, in floors, and are made 12 inches thick, in solid metal of a variety of qualities, to resist either drilling or fracture, equal in quality to the resisting power of the armour plating, but 12 inches instead of 3 inches thick. These doors weigh about four tons each, and are absolutely imperforate. They are opened, closed, and locked by hydraulic power, the precise application of which, for obvious reasons, I cannot describe in detail ; but the result is that the doors are opened and shut in grooves or slides, noiselessly and slowly every night and morning, and when closed for the night the doorway is the last place a burglar would attack with any hope of a successful assault.

As the machinery for working the doors of the safes is enclosed in a perfectly inaccessible manner, it was of the greatest importance that no breakage or failure of any part of it should take place. To guard against accidental defects of material invisible to the eye, it was thought advisable to subject every tooth of the racks and toothed wheels to a pressure many times greater than they could ever be called upon to sustain. This was done at Messrs. Eastons and Anderson's Works, at Erith ; the pumps were proved to a pressure of 3 tons to the square inch, while the rams giving the motive power to the opening and shutting of the doors were tested to the enormous extent of 70 tons of lifting power—the rack and wheel-teeth being tested individually to a pressure of 5 tons. There are photographs on the walls representing these testing operations.

The vault, as well as the several floors of offices beneath the level of the ground, are of necessity artificially lighted and ventilated. The only peculiarity in the former is that there are no lights within the vault chambers, but a strong burner is fixed in the corridor opposite each doorway, which, by means of reflectors, gives a satisfactory light to the whole length of the chamber, so that small writing can be clearly deciphered in every part. The ventilation, which has to be actively worked, is effected by means of fans acting upon exhaust-flues worked by steam power. But another modified system of ventilation by natural means is provided, which comes into use when the machinery is stopped at night, and other times, when business is not going forward. Steam power is also necessary for the hydraulic

as well as for the ventilating fans, and everything is made in duplicate. The Patrol Chamber, under the Sanctum Sanctorum before alluded to, is now used as a large cistern of water, and an iron tank, which forms a portion of the roof of the building, contains 10,000 gallons of water; the engine is constantly occupied in pumping water from the lower to the upper cistern, which gives the necessary supply-head to the rams, which work the lifts, as well as to the machinery for opening, shutting, and locking the safe-doors. The result is an economical adaptation of hydraulic power, so that little, if any, water is wasted, and air is driven in or out of the vault in a lesser or greater degree at will.

A variety of smaller matters of detail which have presented themselves in the course of the building have been more or less adopted by the Company for the purpose of giving greater security and providing for the perfect certainty of invulnerability. For example, in the case of the small deposit boxes, distinct as they are from each other, and each guarded from every other one by two locks at least, it was felt that in some cases a depositor might desire a still further assurance, and a very ingenious contrivance of a glass seal over the keyhole has been invented by General Roddy. It consists of a small piece of glass with an individual pattern, which must be broken to get at the keyhole. The glass seal is of nominal cost, and is attached or detached in a second of time, so there is nothing impracticable in its use either on the score of cost or time, and where such an additional precaution or assurance is desired, it appears to me an admirable safeguard.

Although the actual safe-vault was so designed that it would be proof not only against fire, but also against injury from any debris which could fall upon it if the building above the street level was to be completely burnt down and collapse, it was deemed desirable to make the entire superstructure fireproof, so as to prevent even the possibility of inconvenience to the safe-deposit business which would result from such an occurrence as that just referred to.

A condition of the tenure of the site obliged the building above the pavement line to be constructed of stone, marble, or granite, and forbade the use of brickwork, except as a backing to the masonry. It became necessary, therefore, to find a building-stone which would stand against fire—marble and granite being out of the question, on account of their admitted failure when exposed to great heat. The choice was, of course, limited to the sandstones, the stones containing lime being useless to withstand fire; and after seeing and testing various samples, I decided upon adopting the "Minera stone" from the quarries near Wrexham. This stone had not been previously used in London, as far as I could discover; but it had been employed in several important buildings in Liverpool and Manchester—amongst others, the Liverpool Exchange, the work of Mr. Thomas Henry Wyatt, one of our respected Past-Presidents. Its cost in London was about the same as Portland stone, and it was quite as hard to work. The coarseness of the grain rendered it unsuited for small mouldings or delicate carving, but as solidity and boldness were required in this particular design, no difficulty was found in adapting the detail to this condition. In a test of the fire-resisting qualities of the Minera stone *inter alia*, I put a block of it, measuring about 6 cubic inches, into the middle of a furnace, and there let it remain for about an hour and half. It was then taken out quite perfect, and was plunged into cold water without cracking or calcining in the least degree.

Having decided upon Minera stone for the walls, the next consideration was how to obtain a really fireproof floor, which was a problem not easily solved in a site of this description was an area of 5,300 feet, where the requirements of the superstructure did not admit of any internal wall, excepting on the ground floor, and where the points of support by internal columns were limited to two or three. There was no alternative to the use of iron girders for supporting the brick arches of which the floors were to be constructed, but recent facts had proved that iron as ordinarily employed in such

cases made a building anything but proof against fire. I, therefore, turned my attention to clothing the iron with fire-clay, so as to protect it in a large degree from the effects of heat. From what had been seen and heard on this subject, the idea seemed one likely to give the required security, but before adopting a construction so expensive and unusual, I determined to try by experiments how girders thus protected would stand against any possible conflagration.

The first experiment was tried to test the effect of the construction referred to, when the action of flame during a fire would be continuous for two hours and a-half. A furnace was built, 4 feet wide and 14 feet 9 inches long internally, the top of which was made to resemble the brick-arched floor of a building. The two segmental arches were 9 inches thick, and had a bearing throughout the length of the furnace upon a rolled iron joist, 10 inches deep and 6 inches wide, with a span of 14 feet 9 inches. This girder was protected by fire-clay lining, so that no part of the metal could be attacked by the flames. Fire-bricks were used for the arches so as the better to test the efficiency of the fireclay lining, but ordinary stock bricks were to be employed in the actual building. Plastering was put on the underside of the lining, as in the case of a ceiling, and the spandrels and crown of the arches were filled in with concrete with a finished surface of Portland cement on the top equivalent to the flooring. When the furnace had stood sufficiently long for the mortar and plastering to set, the girder, being then loaded to one-fourth of its breaking weight, deflected $\frac{3}{16}$ of an inch. The fire was lighted and kept up for two hours and a-half with dry pattern wood as fuel. After one hour the deflection of the girder was $\frac{5}{16}$ of an inch in the centre, and at the end of the two and half hours it had increased to $1\frac{3}{16}$. Water was then applied through a hose, and when shortly afterwards the upper part of the furnace was removed, the girder appeared uninjured, although the intense heat had calcined the lower surface of the fireclay. The deflection disappeared as the iron gradually cooled.

The second experiment was for the purpose of testing the same girder under conditions still more severe, being equal to the largest fire which could exist in any one part of a building. The furnace was rebuilt as at the first, and was similarly loaded. The fire was kept up as fiercely as possible for one hour and half, the flame being continuous. It was then slackened, and kept as nearly as possible to a smouldering heat for twenty-four hours; but as the fire had to be renewed from time to time the heat was periodically increased, and the test thereby made more severe than had been contemplated. The deflection of the girder, which was $\frac{3}{16}$ of an inch before the fire commenced, became $\frac{1}{3}\frac{2}{3}$ at the end of an hour and half. It increased to a maximum of $1\frac{7}{8}$, but diminished as the heat subsided. About an hour after the fire was lighted the plastering began to drop off, and four hours later, the fireclay was observed to be red hot. One end of the girder, which projected slightly through the brickwork of the furnace, was throughout quite cool, and no appreciable expansion was observed. At the end of the twenty-four hours the fire was put out as before, large quantities of water being thrown upon the beam and its surroundings, by means of a force pump and hose. The top and side of the furnace were then partially removed, as shewn upon the photograph now exhibited, when all the fire-clay was found upon the girder precisely as when first put on. The girder, which was quite uninjured, has since been fixed to form part of the flooring of the building to which the experiments had reference; and the fireclay was similarly incorporated, with the exception of the piece which is here this evening for your inspection. In my judgment, the result of the above experiments was perfectly satisfactory.

You will observe from the drawing upon the wall that a great variety of sections were required to suit the different forms of girders, inasmuch as the large as well as small girders received the fireclay lining. In all cases the joints were made in fireclay.

The iron columns and stanchions in the building are all encased with firebricks, cut to the outline

required, and built in cement, so that these important parts are protected equally with the girders, in fact, there is no exposed ironwork whatever.

The fire-bricks and other fire-clay material were supplied by the Quinta Company of Chirk near Ruabon, they were recommended to me as possessing fire-resisting qualities of unusual excellence, but before using them, the bricks were subjected also to a severe test as regards hardness, and Messrs. Kirkaldy found they were exceptionably hard, a pressure of 374 tons to the square foot being required to crush them.

In conclusion, I have to give my thanks to those who have been associated with me in carrying out this novel building. The builders, Messrs. Peto, have executed their work well. Messrs. Eastons and Anderson, the engineering contractors, have not only done likewise, but have aided me in many of the special requirements in their department, as also have Messrs. Rosser and Russell in the details of lighting and ventilation; and in the entire conception and carrying out the affair I cannot too highly appreciate the care and attention of my assistant, Mr. Alfred Conder, one of our associate members, and of Mr. H. S. Greaves, my indefatigable clerk of works, who, I am happy to say, has just received a valuable professional Government appointment at the Cape of Good Hope.

The Chairman having invited discussion on the subject,

Mr. EDMESTON, Fellow—said, If I may be permitted, I should like to ask a question of Mr. Whichcord, I did not gather what was the kind of cement used for the columns which were cased with fire clay. Was it Portland cement?

Mr. WHICHCORD.—For the columns and various supports in most cases we used lias, but the surface was of fire-clay.

Mr. EDMESTON.—In the casing of the girders, how were the joints and soffits made sound?

Mr. WHICHCORD.—With fire-clay. The specimen on the table is one of the pieces which was experimented upon in the way I have mentioned.

The CHAIRMAN.—If there is any gentleman present who can give us any information on this special building, or as to the antiquities found in the excavation, we shall be most happy to hear it.

Mr. J. H. PULESTON, M.P., Visitor, (Chairman of the National Safe Deposit Company), responding to the Chairman's invitation said—I am very grateful for your kind mention of my name, but it would be quite out of place for me to attempt to carry on a discussion upon the scientific principles enunciated, of which I may say I am entirely ignorant; I confess I have learnt a good deal during the progress of the construction of the building. I cannot refrain from availing myself of the opportunity you have kindly afforded me, to express my gratification at hearing the interesting paper which has been read by our architect Mr. Whichcord, and I confess, that although I thought the construction of the building in all its parts had become very familiar to me, I have heard from the paper a great deal that was new to me, and a great deal which was not new to me has been rendered more interesting to me than it was before, by the able description we have heard. I have always felt it an honour to occupy the position of chairman of the company, but I have never estimated it more highly than I have to-night, privileged to be here to listen to the discussion of the subject before the Institute of British Architects. I am sure the building itself, no matter how great was his professional fame before he took it in hand, cannot fail to have enhanced the reputation of Mr. Whichcord, by the very able manner in which he has executed this, in many respects, great and novel construction. It is a delicate matter, and generally considered bad taste, to speak of one's own business, for after all my connection with this subject is purely a commercial one, but I feel quite sure, in view of the great practical necessity for such buildings, that this is but the beginning of the system

of Safe Deposits in this country, and that it will be very much extended, and in all the large centres of wealth and commerce, it will be found an adjunct to present facilities greatly needed. This will be more particularly so in the commercial centres of great cities. I happened to be living in America when a similar undertaking to this was commenced there, and I can confidently affirm that all the conditions of security are present in this building, and I venture to think in a greater degree even than in anything yet carried out on the other side of the Atlantic. The business requirements and conditions of success too in this country will be found to be equally important. We have here a greater amount of stored valuables than in any other country in the world. In the palaces of the rich, and the dwellings of the middle classes, and particularly in the City of London, valuable property of every kind is very abundant, and the fullest possible protection to it is afforded by the means provided in this building. I feel, however, I am touching on ground which is not pertinent to the subject before the meeting, and I would simply express my thanks for the opportunity you have given me to make these few remarks, and for the privilege, for such I esteem it, of being present here to-night.

The following communication was then read :—

REMARKS ON THE ANTIQUITIES DISCOVERED IN THE EXCAVATIONS.

By ALFRED WHITE, ESQ., F.S.A.

The care with which the excavations required for the Safe Company's building were executed has not only furnished much valuable information as to objects of interest relating to the arts and to the domestic life of the Romans during their occupation of Britain, but they have afforded many facts which illustrate the nature and course of the Walbrook, of the roads which crossed this river, and have led to the discovery of that most interesting liminary monument mentioned by Mr. Whichcord.

As to the Walbrook, its course was pretty well known by the help of parochial boundaries and former excavations, but in some respects these have been corrected and are recorded on the plans published by the company. An important addition to our knowledge is the depth at which it ran, and that of the roads upon it. There has always been a tradition that the Walbrook was navigable for boats and barges up to this point, but it was difficult to see how this could be the case, considering the rapid rise in the land from the Thames to Bucklersbury. It is known that the level of the street in front of the Mansion House is about thirty-five feet above the bottom of St. Mary Overy Dock in Southwark, where a barge will float at high water. Now the lowest piles observed in these excavations were about forty feet below the surface, and would have had at high water nearly ten feet of water above them. We find that a great timber floor, which appears to have been a landing stage (and similar to many others lower down the brook) was at a depth of twenty-five feet, that is ten feet above the bottom of St. Mary Overy Dock, or about five feet above high water, and at about the same depth was the great road running east and west. These facts prove that the valley in which this river ran was at a low level compared with the land east and west, but that it was not a marsh is proved by the existence of the Roman villa, the tessellated pavement of which was found close to the Safe building, and was nineteen feet below the surface, the lower part of the flue beneath it being twenty-one feet deep, or only ten feet above high water. Thus we see that Stowe's record that boats were towed up the Walbrook to Barge Yard, in Bucklersbury, might have been quite true at the time of the Roman occupation, and perhaps long after, and it is known by the arrangements for the supply of Thames water to the baths of the Roman house, preserved under the Coal Exchange, that the tide rises now to about the same height as it did when they were in use. The bed of this river appears to have been used as a rubbish shoot for many ages, for the bottom of the watercourse, after the arching over, was considerably above the level of the Roman houses, roads, and landing stage, and all the material between these levels was what had

been brought from other parts of the city :—very much of it evidently the result of the fires which frequently destroyed parts of London in early times : and even after the sides of the brook were secured by piles it was with some difficulty that the authorities prevented a continuance of this use of the river as a receptacle for such refuse.

The most interesting discovery made during the works, was the *Arca-finalis*, which has been described by Mr. Whichcord. The course or level of a river are not in great danger of being entirely obliterated in its whole length, but such monuments as this *arca* are so obscure to the excavator, or even to an intelligent clerk of the works, that they are in great danger of being entirely destroyed without record, especially in such a place as London, where works have to be executed with as little loss of time as possible. The valueless materials selected by the constructors of these boundary marks to prevent their removal for gain, or even the use of the materials would, in the execution of works in a town, secure their transfer to the cart and rubbish shoot. The mode of forming such marks of coincidence of boundary lines is fully described by many ancient writers, and was universally adopted by the Romans and other nations of old to mark not only the limits and internal boundaries of towns and cities, but also those of the various limits of provinces and smaller divisions of public property and of the estates of the various proprietors of the soil. This kind of limitary mark was constructed in the most varied manner, according to the nature of the soil, and the products of the country in which it was placed. The principle on which it was formed was to excavate to some depth, sometimes even to forty or fifty feet deep, and in the shaft thus formed to deposit at various depths such valueless materials as broken pottery, fragments of iron or other metals, bones, wood, branches of trees, shells, stones, baskets, &c., either burnt or unburned, and in many cases in ten or twelve layers, each separated by a foot or more of earth. In such soil as that in the vicinity of London the sides of the shaft would be sustained by such a wooden frame as existed in the *arca* just described, but frequently, in the place of such a simple frame, a lining of solid planks of oak secured by braces is used, and this continued to a great depth : or in chalk and other solid rocks a simple well or shaft is sunk, and the various deposits of the things before described placed at the various depths between layers, generally of a mixture of the rock with the top soil, to mark more distinctly the excavation. When these shafts were filled in, a post of wood, a large stone, or a column was placed above, or at other times a tree planted or a wrought stone monument was placed, such as the famous London Stone, or even structures of stone or brick ; and these have been sometimes afterwards replaced by the market cross of the town. In rural districts often a mound of earth was placed over such a deposit. Such a mound, with its deposit beneath, was discovered a year or two ago marking the place where three hundreds of the counties of Middlesex and Hertfordshire met. The reasons for placing urns and other things outside these monuments, is also fully described and their proper distances defined, so that those who examine these marks may know where to find them. The amphora found at five feet south-west of this *arca* probably pointed to the way across the brook at the road which would lay in that direction. This is not the only *arca* which has been found in the course of Walbrook. In 1835 a shaft was discovered to the east of the middle of Moorgate Street, near an inn called the Swan's Nest, situate on the bank of Walbrook. This shaft was also on the east side of the river. It was three feet square, the sides being lined with narrow upright plank about two feet long and two inches thick, but this was discontinued near the bottom. In this shaft were found many earthen vessels laid on their sides, a Samian patera and fragments of the same, a small coin of Allectus, an iron boat-hook, &c. This was at a place where the boundary of the Wards of Broad Street and Coleman Street cross the river. Another such structure I have every reason to believe existed at the juncture of the Wards of Walbrook, Cordwainer Street, and Vintry on this river, near Budge Row ; a stone with a round hole in the middle

from there is in Guildhall Museum. It will, I think, need no apology if I implore every member of your profession to preserve and carefully examine any such structure which may be found in works under his care in London, or any other town or in rural districts. Where the bounds of a county, a hundred, a ward, or a parish may meet those of another, it is always worth while to look after such a mark, and we can only regard with regret that such a man as Sir Christopher Wren was not aware of the importance of these marks when he had the City of London under his charge. At that time it must have been easy to determine the whole of the Roman laying out of London, or he might have investigated what existed beneath such monuments as London Stone, the Boy and Pannier, in Pannier Alley, &c. The discovery of this arca on the east side of Walbrook goes far to prove that the part of London lying on this side of the river was first laid out and occupied by the Romans. It may be well to mention that these deposits have generally been considered of a sepulchral character, and the presence of burnt wood and earthen vessels has done much to lead antiquaries into this error, but even the finding of a funereal deposit would not prove that it was not a boundary mark. Interments were ordered by the Roman Emperors to mark boundaries, and perhaps all coffins or tombs with ornamental sculpture on one or more of their sides were thus employed. Many of these coffins or tombs are plain on one or more sides where they were built into a wall.

The following are good examples of these pits:—

Jordon Hill, near Preston (north of Weymouth Bay) Dorset. Shaft fifteen feet deep, four feet by two and a-half in diameter, sides built up of thin flat stones pierced for roofing. Contents: Layers of charcoal, flat stones, coins of the lower empire, birds' bones, a sword, fragment of spear head, rings, crooks, part of the handle of a bucket, fragments of coarse pottery, and two vessels of the same, perfect, all having been subject to fire.

Bekesbourn, near Canterbury. Shaft twenty-five feet in gravel and loam; to the depth of six feet planked, then, four heavy cross-beams, and below planking again. Contents: Shaft filled with large flints, and near the bottom an urn of black clay; then more large flints and five urns, then a flat stone covering a cavity in the earth, on which was placed a circle of bones and teeth.

Heydon Hill, near Royston, Essex. Shaft in chalk, ten feet deep, nine feet long by five broad. Contents: Filled with ashes, and an altar: on the floor a bronze bracelet, two or three iron instruments, coins of the Constantine family, bullock horns, fragments of many sorts of pottery.

Biddenham (one mile from Bedford). Shaft cut in gravel. Contents: Burnt stones, pottery, human skeleton, altar slab, logs of wood, and fragments of about fifty urns. Pit filled up with pebbles calcined.

Sewell, Bedfordshire. Shaft in chalk at least 116 feet deep, at twenty feet deep steps or footholes cut and continued downwards. Contents: At fifty-three feet bones of small animals and birds, then burnt wood, unbaked pottery, human bones, Roman tile, piece of squared sandstone, black flints, red pottery, &c., all showing the action of fire.

Ipsden, near Wallingford, Oxfordshire. Shaft sunk in chalk, with steps as before.

Duston, near Northampton. Three excavations in iron stone, four feet deep, in a radiating position. Flooring covered with ashes, in which were small coins.

Highwood, near Watton, Norfolk. Three shafts, one forty feet deep, lined with wood. Contents: Samian ware and other pottery broken, charcoal, baskets, a strainer, ox and other bones, wall plaster, a knife, staves of a bucket, sandals, oyster and mussel shells, urns, a bent piece of iron, a fibula, branches and leaves of hazel, bottles, neck of amphora, &c.

The curiosities secured during these works include most of the articles found when we reach the

Roman level. The pottery illustrates well the great variety, in form and ornament, of the Samian ware: and of other kinds, amongst the earthenware are a lamp stand and two moulds for the manufacture of lamps. A great variety of works in leather were found well preserved, and the objects in iron, bronze, and other metals, are amongst the most perfect examples ever discovered. The leather and metals owe their preservation to the manner in which clay secures the presence of moisture, but effectually excludes any action of the atmosphere. In iron this is well shown, and especially in several long chains, where every link is free from adhesion, by oxidation, to its neighbour, and the metal is perfectly sound and strong. Hundreds of styli are quite perfect, some with bronze, beautifully inlaid. Delicate and elegant brass chains, and many other objects in this metal and in bronze, are as perfect as when they left the maker's hands. But, perhaps, to the architect the most interesting of these metal relics are the several forms of tools, which, for England, are quite unique. They are mortice chisels of several sizes, gouges, wood carving tools, drills, and others whose uses are not clear.

This collection of objects of ancient art and implements proves that we need not look exclusively to Italy for examples of Roman manufactures; but wherever this enterprising people made a footing and introduced their civilisation, they taught the people to work in every variety of material, even in such a distant province as Britain.

Mr. LEWIS SOLOMON, Associate.—After the interesting remarks which we have just heard upon the antiquities found at this spot, I would beg leave to say a few words with regard to construction. At the end of 1871, some six months before this Safe Deposit Company was publicly advertised, a client consulted me with reference to a similar structure which he wished to raise on the precise site now occupied by the Safe Deposit Company's buildings. In order to get thoroughly acquainted with the subject, I visited several strong rooms and buildings. Amongst others the three following were the most noticeable. First, the Clerkenwell Prison; secondly, a well-known banker's strong room; and thirdly, the patent safe of Mr. Streeter, then in Conduit Street. The walls of the prison were thick and strong, but not of a construction which would withstand the manipulations of clever burglars, although good enough for their especial purpose. In the banker's strong room, the walls were built of fire-brick, with iron bars or rods let in at close intervals. The ceiling was of corrugated iron with a thick layer of concrete in the lap. The doors were of two sorts—one made by Chatwood, the other by Hunt, one opening outwards and the other inwards. The third place, Mr. Streeter's strong room in Conduit Street, was a very extraordinary structure, the patent for which belonged, if I recollect rightly to Mr. Tobin. It was built during the time of the French war, and was principally used by the refugees from Paris, &c., to store their valuables in. It consisted of a very large iron safe in two thicknesses, with very strong doors, and between the outer and inner coats there was a sheet of water supplied from a large tank above. This safe was so constructed, that in the event of anyone piercing the iron sides, the water would come down from the tank, and being in communication with a system of electrical bells, these sounded in different parts of the premises. With regard to the building under consideration, we thought a very important point was to carry an electric current round it in connection with Scotland Yard, so that in the event of anyone tampering with the building, or of a fire occurring, immediate communication would be made with the police authorities. The key of this safe was divided into four pieces, which had to be joined together before the door could be unlocked, so that to rob the safe, it required the four men entrusted with portions of the key to enter into a conspiracy.

Mr. J. E. SAUNDERS, Fellow.—I trust I shall not be thought out of place if I venture to move a vote of thanks to Mr. Whichcord for the valuable Paper we have listened to, in which compliment I think we may very properly include Mr. Alfred White, who has favoured us with some most

important antiquarian remarks in connection with the subject. I fully believe, without going into the details of the site which Mr. Whichcord has so completely explained, that this was part of the embanked side or wall of the old Wall-brook, and a continuation of the grounds of the Roman Villa, of which a portion of the pavement was discovered on the site of the Union Bank, and recently on that of the National Safe Deposit Company's building. If you go as far as Cannon Street, it forms a wall or terrace, and on the eastern side of St. Swithin's Lane I found three arches, evidently forming a portion of the said terrace, possibly part of its Thames frontage at its junction at Walbrook. While the brook ran up as far as the Swan's Nest in Coleman Street Ward, the terrace apparently continued to the grounds of the villa on the site of the Union Bank. The illustration we have had of the preservative power of clay as shown in the case of the various antique implements and articles of iron exhibited here this evening, must also be a matter of interest, especially when we find even leather and other materials which we should not have expected to be in existence, preserved in good and fair condition. I believe the National Safe Deposit Company have done a great public good, and I only hope that the pecuniary returns they may receive will be commensurate with the great utilitarian work which they have so well carried out in the City of London. As a member of the Metropolitan Board, I am sure I am thankful for the handsome rent which they pay us. Although we may be allowed to indulge in general remarks upon the construction of strong rooms and places to be used as safeguards for valuable property, it is obvious that particular and definite instances, especially those of private firms, ought not to be publicly discussed. I have myself been concerned in the construction of strong rooms for many clients. In one instance, the outer walls and arches were constructed of ordinary brickwork two bricks thick, with one brick external and two bricks internal linings of fire bricks; the spandrils being filled with Portland cement mixed with broken glass. Within these rooms there is a plating of chilled wrought iron rivetted to wrought iron T ribs with smaller L iron ribs between, and the packing filled up as before. The floors, which are of enormous strength, are laid upon thick beds of concrete in Portland cement, and covered with very large blocks of granite, the blocks being so dowelled together on the four sides, that in order to remove one block from its place it would be necessary to raise the surrounding ones. The blocks were rebated, and T iron let in flush and bolted to the feet of the T ribs. The entrances were the ordinary strong room doors, but doubled. These rooms were supposed to be as strong as they possibly could be made, although they would hardly be proof against "the scamp with the pen behind his ear," if he succeeded in gaining admittance to them. With the doors open and during the hours of business, even Mr. Whichcord's building might be liable to that; but as to any attempts to dig, or drill, or blow up, we have a building, which is considerably in advance, I think, of anything that has been done as yet, even by our American friends. One would have liked to have heard a little more about the testing of these columns by fire, as we have in relation to the girders; but Mr. Whichcord has told us they were of a certain construction, and which will answer the purpose, but we should have been glad to hear a little more of the details. The other points of the paper completely speak for themselves, and with the known genius of the British architect, we may possibly do something more in this direction in the future than has yet been accomplished. At the same time, I am sure we must all feel that we have in the heart of the city a building of which we can be proud, and doubly so, as it is the work of one of the members of this Institute.

Mr. EDMESTON.—I have very great pleasure in seconding the vote of thanks which has been moved. If it is the case that in this country there is a greater amount of valuables to be stored than in America, I think we have now got a better building for that purpose, and for that we have to thank the public spirit of the National Safe Deposit Company, who have in the most liberal manner carried out that which was to be done, seconded by the able co-operation of their architect. The Paper

is suggestive. One feels that there is more to be learned than we have heard in the Paper or in the remarks that have been made upon it :—for instance, the way in which these fire-clay envelopes for the girders were fixed, and how they are to be kept in place when the girder deflects with heat, which would be likely to cause the joints to open. Perhaps it may not be right to ask too much in a matter so new and special; but I apprehend while the testing of the casing of the girder by fire was being made, that the girder was open at the ends with a draught of air passing through the space between it and the fire-clay casing, which would help to keep it cool; and if so, is there any like provision in the building? Again, it would be interesting to know why Mr. Whichcord chose iron columns for the supports cased in fire-brick. They look as though they might as well have been built of fire-brick alone, which might have been preferable. At the same time I have no doubt the matter has been well considered in every point, and that there is good reason for what has been done; but there is much more to learn.

Professor T. HAYTER LEWIS, Fellow.—I happen to have witnessed the commencement of this work, to have seen it in progress, and to have examined it when completed. As a member of the committee appointed by the Council for the Sessional Papers of the Institute, I may allude to the difficulty we often find in prevailing upon architects to describe their own works. Architects usually feel, as Mr. Whichcord himself did, a natural hesitation in doing so. If, however, we wanted a justification for such a course, we could not have a better one than is afforded by Mr. Whichcord's paper; for I am sure we must all feel that a scientific work of this kind could not possibly have been so well described by anyone as by the architect himself, and I am equally sure that the members will agree with the Committee, that we ought to have, at the Institute, full descriptions of interesting buildings recently erected, and that they could not be so well described as by the architects of those buildings. I have myself been personally engaged in constructing strong rooms for banks and for companies, but I should be rather afraid (for the obvious reasons which have prevented Mr. Whichcord's going much into details) to describe the way in which these particular strong rooms were made. I may however say, after some little experience, and having gone over Mr. Whichcord's drawings and the building itself very carefully, that I do not see how this building could be burned down nor broken into. Owing to my connection with the insurance offices, I have seen several thousand buildings injured and destroyed by fire, and I do not think, as far as I can judge, that there is the slightest risk of this building being so destroyed. There is scarcely anything to burn. Everything except the doors and sash-frames, and a few thin partitions, is unflammable. Whether or not the system adopted in this instance would answer for warehouses filled with combustible goods, and subjected to intense heat for several days together, I am not prepared to say, but as far as this particular building is concerned, and as far as human judgment can go, it seems to me to be substantially fire-proof and thief-proof. It is very interesting to see the way in which these doors are moved and shut. With these doors, a foot thick, it would puzzle anyone to get into the safe, under circumstances of deliberate operation, much more under the excitement of liability to disturbance; and I was informed that a clever smith broke fourteen drills—[Mr. Whichcord: And ground fifty-seven more]—in experimental operations on one of the iron plates of this building without being able to pierce it. If I were inclined to take exception to any portion of the Paper, it would be to the use of the term "sanctum sanctorum," or "holy of holies," to this depository. I have very great pleasure in supporting the vote of thanks to Mr. Whichcord who has produced a work which is both an ornament to the city and which appears to me thoroughly to answer the purpose for which it was designed.

Mr. PULESTON.—Although the object of the Meeting is to discuss certain principles of construction which have been adopted in this building, I should regret very much that we should separate with the idea that there were defects in the system of conducting the business. Reference has been made

to the robbery which was effected in America by a clever rogue, who prosecuted his calling with a pen behind his ear, and who at the time was supposed to be a clerk in the banking establishment: but, it must be remembered, that had nothing to do with burglary or fire. Still, in our case, we have made full provision for protection against such an occurrence as that referred to. No person can go into the safe compartments of the building unless he is personally known to the officers of the company; and when anybody has to do with any securities, he has to pass through a peculiar description of turnstile; and, as I have already said, the person must either be personally known to the officers, or his description must accord with the written description in the Company's book. But, even if by some impossible means, a person got down to the great vault, it would, if he were a stranger, be of no avail for any improper purpose. He must produce the key of the safe he has to go to, and *that* will not open the safe except with the aid of the master-key of the officer in charge, who has to put back the bolt in order to allow the safe to be opened, neither key without the other being sufficient, and each safe having a different key. Reference has been made to the establishment of a means of speedy communication with the police, and upon that I may say it has been effected by electrical bells in connection with police stations. This was one of the first requirements to which attention was given, and it is now in active operation. At any moment we can communicate with the police. Furthermore, the system of watching has been so arranged as to prevent the possibility of conspiracy and collusion. Arrangements are made with the police authorities to have different men on duty on different weeks, and every safeguard is provided, in addition to the burglar and fire-proof character of the building, which human ingenuity and architectural skill can possibly devise.

A vote of thanks having been unanimously accorded to Mr. Whichcord for his Paper, and to Mr. Alfred White for his Remarks,

Mr. WHICHCORD said, I thank you very much for your kind appreciation of the small endeavours I have made. First of all, with regard to the electrical communication to which Mr. Solomon has alluded, I did not think it was either discreet or within my province to refer to that or to various other precautionary matters of detail which have been adopted by this Company. I have confined myself strictly to the constructive character of the building. With respect to the appellation of "*sanctum sanctorum*," to which exception has been taken by Professor Lewis, I used it for want of a better term, and only to convey the idea of an inmost and impenetrable chamber. In reply to Mr. Edmeston, the girder in question was not a box girder, or one with a hollow space through it. It was of the ordinary **T** shape, and was made tight at both extremities and built into the wall; and inasmuch as the fire which I described was made of dry pattern wood, the heat and flame to which the girder was subjected was of a most intense character, while the girder in its horizontal position was covered with a surface of clay only two and a-half inches thick upon the lower flange: this being a more crucial test than would have been the case with the columns in a vertical position, and with a covering of clay of four and a-half inches. It would also have been a difficult matter to have tested the columns, and I did not think it necessary to put the company to the expense of the experiment after the more severe trial of the girder. With regard to the question why I did not use brickwork for the vertical supports throughout the building instead of iron columns;—I do not at this moment remember the precise weight which bears upon the internal columns, but it is something enormous, because the whole of the roof, together with a tank of 10,000 gallons of water, as well as the several arched floors of the building, is carried by these columns, and no other material but iron would have been practicable having regard to the space that brick piers would have taken out of the superficial area of the building.

The Discussion having thus been brought to a close, the Meeting adjourned.

Royal Institute of British Architects.

At the Ordinary General Meeting of the Institute, held on Monday, the 31st of January, 1876,
Sir GILBERT SCOTT, R.A., President, in the Chair.

OLD CLEEVE ABBEY:

THE CISTERCIAN ABBEY OF ST. MARY IN THE VALE OF FLOWERS, CLIVE.

BY MACKENZIE E. C. WALCOTT, B.D., F.S.A., Præcentor and Prebendary of Chichester.

WITHIN a few minutes' walk of the Washford Station, on the Taunton and Minehead Railway, are situated the remains of the Cistercian Abbey of St. Mary of the Cliff, Old Cleeve. They have been recently recovered from base uses, and are now safely guarded under vigilant and loving care. Seated in a valley, which a Mohun of Dunster, one of the early benefactors of the abbey, called the "Vale of Flowers," reminding us of the similar title borne by the Westminster Abbey of Wales,—*Strata Florida*, it nestles under a wooded height towards the east, which was quarried by the monks at their first settlement here. From the north it is sheltered by a steep declivity; southward beyond a richly cultivated expanse of country rises the swelling line of the Brendon Hills; and on the west, in front of the gatehouse and the precinct wall, with a brawling gurgle, runs a clear and rapid stream—the Rood-water, so called, from the Holy Cross Chapel at Watchet, the present name of the village being a corruption of Watchet-ford. Two gigantic trees—a sycamore and walnut—stand up conspicuous, like warders, to mark the position of the abbey itself. Leland rode by almost within sight of the walls, but never drew rein to describe what lay behind them.

The stern order of the Cistercians chose such sites, and the tradition still lingers on the lips of the peasants of Cîteaux (a name betokening a place of flags and bulrushes), not from from any eye to picturesque scenery or richness of soil. It was not that they preferred the shelter from bleak winds to the splendour of elevated situations, but "our fathers," St. Bernard said, "searched out the damp and low-lying valleys wherein to build their monasteries, so that the monks, being often in ill health, and having death before their eyes, should not lead a careless life."¹ Their habit of white was adopted as a sign of the spiritual joy of their hearts, and a protest against the black, and in their eyes penitential frock of the "tepid" Benedictine.² Their scapular recalled the form of our Lord's

¹ Op. S. Bernardi, i. 398. Brusch gives the popular error—

"Semper enim valles, sylvestribus undique cinctas
Arboribus divus Bernardus, amœnaque prata
Et fluvios . . . amabat."—(Ap. Hospinian. p. 315.)

S. Bernard walked along the shores of the Lake Lausanne during a whole day, so lost in meditation that his eyes were sealed to all the beauties of the scenery. P. Innocent II., in unadorned Clairvaux, saw "only four walls."

² Martene, *Thes. Anecd.* v. 1649. S. Bern. Op. i. 222–3. The Clugniacs were, however, the chief object of Cistercian hostility (Petr. Ven. Ep. lib. iv. ch. xvii.), and retorted by staring out of countenance the white-robed Bernardine, as if he were an alien and foreigner (Petr. Ven. Ep. iv. 17). Reyner says that every Welsh abbey belonged

cross. Sometimes they removed their houses to less pleasant sites—from Tulket to Furness, from Stanlaw to Whalley, from Oswaldkirk to New Byland, from Chotene to Croxden, from Pulton to Dieulacres, from Conway to Maenan, from Bernoldswick to Kirkstall. They even selected a place so contracted as Rievaulx, where they were compelled to build in open contravention of the universal practice of orientating the high altar. They secluded themselves among moorlands, vales, pathless solitudes, and in forest deeps, far away from the haunts of men, where they made the wilderness blossom into a garden, vineyards, and cornfields; and to this isolation we owe the fact that whilst the service of prayer and praise has never ceased in many churches of the Benedictines and Austin Canons Regular, it is continued at this time only in four Cistercian minsters—Scarborough, Conway, Margam, and Dore. They spent their almost silent life (conversation being chiefly maintained by an elaborate code of signs),¹ as Peter de Blois says, “on slender food, in rough vesture, in vigil, confession, discipline and psalms, in humility, hospitality, obedience, and charity;” and St. Bernard adds, “in prayer and fast, in study of Holy Writ, and hard manual labour.” It was a peculiarity of the Order, from their constant meditation as they worked, and their sympathies with natural objects fostered in their special love for the Song of Solomon, that they bestowed upon their sequestered homes, dedicated to the “Lily of the Valley,” the most beautiful and poetical names connected with valleys, waters, or home-love—“Fair Land,” the “Place of Benediction,” “Lovely,” or “Happy Stead,” the “Vale of God,” and “Grace Dieu;” and in France the Valley of Wormwood was re-named Clairvaux, the Vale of Glory. They were such industrious farmers that they conceived themselves excused in being absent from mass in the busy harvest time.²

“Night Vigil”³ was the gloomy name which they bestowed on the service before dawn, which the other great orders in a brighter spirit termed their “Matin Lauds.” Their statutes forbade the keeping of pets,—as they put it with a grim humour, “all creatures which provoke levity, such as peacocks, storks, and bears.”

Their buildings were remarkable for a total absence of ornament.⁴ Carvings and pictures, except one image of our Blessed Redeemer, were rigidly prohibited both in the church and offices, because inimical to religious gravity and meditation. A painted cross of wood (for our Lord died upon a cross, not of gold, but of wood), with two candles,⁵ was the only decoration about the altar; the glass in the windows was white, like the colour upon the doors. A low central tower held at most a greater and lesser bell,⁶ and the pavements were of plain tile. St. Bernard regarded as Judaical “the vast height

to the Order, and that their habit rendered them popular, as it recalled the ancient dress of British monachism. (Apost. Bened. tr. 1, sect. 1, p. 209.) It is a curious fact, that the Cistercians were “confederated” only with the sympathising Præmonstrant Canons, and one Benedictine house, St. Augustine’s, Canterbury.

¹ Petr. Bles. Ep. lxxxii. p. 253, ed. Migne.

² Op. S. Bernardi, ii. 722.

³ Op. S. Bernardi, iii. 81.

⁴ See the notes to my Church and Conventual Arrangement, p. 139; the Stat. 1289, dist. iii. c. 1, fo. 18, c. ii., iii. fo. 18 b, Harl. MS. 3708; the Custumal in Add. MS. 18, 148; Martene Thes. iv. 1257, 1312, 1362; and the Statutes of 1247 in that collection. A cross stood below a pendant pyx on the altar, and the candlesticks on the floor.

⁵ Rit. Cistere. lib. i. c. iii. § 8; Gen. Statutes, 1256, Harl. MS. 11, 298, dist. 1, c. i., ii., iii., vii. ff. 41, 41 b. See the Inventories of Merevale and Dieulacres, which I printed in the Archæologia. In the latter church, “over the partition of timber in the body of the church, were 2 candlesticks of latten before the crucifix.” Two lights burned *circa altare* at the exhibition of relics on festivals. (Ordin. Cist. c. lxiv.; Rock, Ch. of our Fath. iv. 89.) From behind the altar the cross was brought out on Good Friday, so that it must have been detached from the wall. (Ib. p. 89.) The ancient Cistercian use recognised only lamps, “ad gradum presbyterii; in medio chori; et in retro-choro,” burning at mass, matins, and vespers of feasts. There were two other lamps for guests next the retro-choir, and for the converts (Usus Antiquiores, P. ii. c. 67. Migne, clxvi. 1438), besides tapers in the standards or sconces on the two sides of the sanctuary.

⁶ Hayles (like Rievaulx) at the dissolution possessed five bells, “poiz by estimacon m̄vccc weight,” Byland seven, and Meaux three and an organ. (Chron. iii. 240.) For the dedication of churches to St. Mary, absence of decoration, and limitation to two bells, see Harl. MS. 3708, dist. iii. c. 1, 3, ff. 18, 18 b. Books of law were proscribed (fo. 19).

of churches, the idle waste of space, their sumptuous glistening smoothness, and curious decking with colours."¹ But with time reaction ensued, the churches glowed with rich glazing, pictures,² and encaustic tile; lofty towers³ rose, and presbyteries were enlarged into splendid structures, with broad aisles.⁴

John de Athon tells how ascetic diet, at first consisting of pottage, then wine or beer, and two dishes of vegetables, changed into generous fare. Girald du Barri raises an indignant protest against pride and ignorance; and Cœur de Lion, on his departure to the Holy Land, in reply to the allegorical rebuke of Fulke, the brave-hearted parish priest of Neuilly, bequeathed his second favourite, but wicked daughter, Avarice, as a bride to the Cistercians.⁵

Granges grew into townships; labour was delegated to lay-brothers, whom foreign chapters proscribed in England as ale-bibbers and malcontents, and great abbots rode in chariots drawn by six horses. At last came the bitter Nemesis of rapine, indiscriminate destruction and sacrilege, fatal to art and history; and the consequence is that this evening, in place of conducting you into a church venerable with the association of seven centuries, I can show you only broken walls, a few fragments, and some slight evidences of its former condition.

We have no account how Abbot Ralph and his twelve brethren (the indispensable number of a new community⁶) coming from Revesby among the Lincolnshire fens, sped on their arrival. We know not whether the first buildings were "humble," as those of Kirkstall, destitute of any stone-work; a chapel of wattle, with the foliage of an elm to serve as dining and sleeping-rooms, as at Fountains; or in equally modest guise, a common house of mud, with a second structure combining an oratory above and a dormitory in the "lower solar," as at Meaux; or a timbered log-house, like that of Jorevalle.⁷ The site was, of course, marked out as holy ground by crosses of wood,⁸ and the buildings were erected "according to the Form of the Order,"⁹ under the supervision of Hugh, abbot of Revesby.¹⁰ "Founder of the Abbey of St. Mary of Clyve,"¹¹ was the simple epitaph there of William

¹ "Oratoriorum immensas altitudines, supervacuas latitudines, sumptuosas depolitiones, curiosas depictiones, auro tectas reliquias, pulcherrimas formas sanctorum, geminatas non coronas sed rotas circumseptas lampadibus, sed non minus fulgentes insertis lapidibus, et pro candelabris arbores erectas, multo aeris pondere, miro artificis opere fabricatas, nec magis coruscantes superpositis lucernis quam suis gemmis."—Op. I. 544, 545.

² Monasticon, 931. M. Julie de Laurières, describing the abbey of Aubazine to M. Bouet, says: "Les fenestres ont conservé ses vitreaux blancs munis de leurs armatures de plomb, de tout est du XIIe siècle." They are portrayed by M. R. Bordeaux in his work on the restoration of churches.

³ At Fountains, Kirkstall, Furness, Scarborough, Melrose, etc.

⁴ At Rievaulx, Beaulieu, Tintern, Neath, Jorevalle, Netley, etc. See also Ellis' Spec. i. 87, for the "well-fair abbey of church, cloister, bower, and hall." Byland has a western aisle to the transept. Despite the extreme simplicity of their robes, it was, Matthew Paris tells us, to the Cistercian abbots that the Pope wrote in 1246, bidding them send to him the choicest orphreys, for which England was then famous, to adorn chasubles and choral copes. (P. 616, ed. Wats.) On the other hand, the naves of Croxden and Grey were aisleless, and Balmerino was an oblong, with a central arcade.

⁵ "Do cupiditatem meam monachis de ordine Cisterciensi."—Hoveden, iv. p. 77.

⁶ MS. Addit. 11, 298, dist. 1, cap. vi. fo. 41 b. Twenty monks colonised Hales.

⁷ Monasticon, 855-6, 739, 795, 870.

⁸ Arundel MS. xvii. fo. 53 b, at Newenham "pro signo dedicationis poni fecit cruces lineas, ad sancta loca et benedicta discernenda, donec circumdata extitit curia sive abbazia opere fossato."

⁹ Monasticon, 743, 801, 826, 855, 856, "de more," or "ex ordine dispositio."

¹⁰ Revesby consisted of a nave of eight bays, a transept with three eastern chapels in each wing, and a short presbytery, thus closely resembling its daughter abbey. The rood-loft was very broad, and arranged in the fourth bay from the crossing. The site is at present being harried, and the very foundations are in course of eradication. The dimensions were:—The nave, 144 ft. × 62; the aisles, each 15 ft., and the central alley 32 ft.; the ritual choir occupied the four eastern bays of the nave; the crossing was 32 ft. square; the transept, 122 × 32, and, with chapels, 47 ft. The presbytery, 47 × 30; the whole internal length, 223.

¹¹ Cotton MS. Tib. E. viii. fo. 208, and corrected in the Topogr. and Geneal. i. 27; MS. Digby, xi. fo. 17, Bodl. Libr.

of Romare, lord of Bolingbroke, grandson of the Earl of Lincoln, who died in 1182. The charters fix the date between 1186 and 1191, nearly a century since the time when Stephen Harding and four brother-monks from Sherborne¹ left the laxity of Molesme for the desert of Cîteaux. Whilst the chronicler of the Order assigns² June 24, 1198, as the date of the "Abbey of the Vale of Flowers Clive," we may assume that in the latter year the buildings were actually commenced. Cleeve was the granddaughter of Rievaulx, to which Clairvaux, in France, sent the first colony. St. Mary's was the statutable dedication of every Cistercian minster.³

When in the course of my summer holidays, in July 1875, the latest authorities had stated that "the chapel was entirely destroyed," and the best-informed writer of a special memoir conceived that "the south transept was occupied by a tower," and was quite unable "satisfactorily to ascertain the extent of the building towards the west,"⁴ Mr. Luttrell, of Dunster Castle, who had only recently acquired the property, had already rescued the conventual buildings from farm purposes, and although engaged in a costly restoration of the priory church of Dunster, heartily gave his assent, with the certain prospect of a considerable further outlay, to my seemingly hopeless project of determining, if possible, the dimensions and ground-plan of the Minster, and, if success crowned the endeavour, of securing the hallowed site from desecration. I found that the west and south walls of the wings of the transept were standing, and under a mask of linhayes, pigstyes, and a cart-shed, discovered the entire south wall of the nave. To the north was a field, with a duck-pond, a farm-road, gates, heavy accumulations of soil, and bewildering modern walls.

The surviving portions were clearly of the same size as the corresponding parts of Buildwas and Valle Crucis,⁵ and I constructed an imaginary minster on their lines upon the principle of the mediæval aureole, and the system of squares so clearly laid down by Prof. Cockerell in the *Winechester Volume of the Archæological Institute*, and by Mr. Kerrie in the *Archæologia*, xix. 368. Trenches were dug transversely from the western wall, both of the transept and nave: the first gave me the re-entering angle at the north-eastern junction of the cross, and the latter revealed a buttress, which led to the disclosure of the foot-stalls of the southern arcade of the nave. In a line with these I found the side walls of the presbytery, which terminated in the return, or east wall. Then assuming the position of the crossing, excavations were made westward, and revealed the side-walls of the ritual choir, and at a distance of one bay the base of the rood-loft. In these operations a wall, 100 feet in length, was demolished, cartloads of ordure were removed from the site of the sanctuary, and earth and masses of rubbish, in some places 7 feet in depth, and nowhere less than 2 feet, had to be removed by the manual labour of a strong gang of navvies. The spoilers had done their work as if they gloried in it; huge fragments of rubble thrown bodily down are suffered to remain and tell their tale of shame and violence. We found only two pieces of glass⁶ and lead, a few inches of green glazed crestring tile; a canister of lead with a cross on the lid, possibly a pyx

¹ See Will. of Malm. ii. 511-517; Giraldus Spec. Eccl. dist. ii. c. xxxiv. p. 111; and Prof. Brewer's masterly Preface. The Annals of Waverley, in Gale's edition, ii. 163, mention Waleran, abbot of Cleve, and his successor, Alan of Bordesley, in 1188. Mr. Luard reads "Dene" abbey.

² Cotton MS. Faustina, B. vii. fo. 36.

³ MS. Addit. 11, 298, dist. 1, c. 1, fo. 41; Harl. 3708, dist. iii. c. 1, fo. 18. There are exceptions: de choro Benedicti (Middleton); de loco B. Edwardi (Netley); de S. Edwardo (Balmerino); and many more.

⁴ Murray's Handbook for Somerset, p. 408; Proc. Somers. Arch. Soc. vi. p. 89.

⁵ Buildwas measures 163 × 50; transept, 84. Valle Crucis, 165 × 67; tr. 98. Basingwerk, 162; tr. 84. Jerpoint, 161; tr. 79. Hove, 155; tr. 88. Grey, 120; tr. 74. Boyle, 181; tr. 79.

⁶ The reason why glass is so seldom found in excavations of minsters is, that from its extreme value at that period, when windows were actually transported from one rich house to another, to fill the empty frames before the arrival of the master, it was no doubt transported carefully away.

for wafers ; portions of delicately-carved tabernacle work ; a single gargoyle ; a grotesque bust, rare indeed in a Cistercian house ; wrought stones, now laid carefully down to mark the missing foundations, and to form a ground-museum ; a tomb ; a treasury of loose tiles of at least fifty different patterns, now stored away in a properly-guarded room ; and the grandest discovery of all, a superb encaustic pavement still undisturbed in its place.

Masons, under the direction of Mr. Samson, of Dunster (whose zeal and professional knowledge¹ ably seconded me in the progress of the good work, as far as his avocations permitted him the opportunity), opened all the doorways and windows, and closed up unsightly rents in the conventual buildings. Carpenters secured the floors ; roofs were repaired ; then followed a vigorous and unsavoury purging of abominations and accretions ; and so within the space of two months and a half once more the abbey was rendered accessible to visitors, under proper restrictions to secure orderly behaviour, strongly fenced in, and thoroughly cleansed from all that could offend the sense or true reverential feeling for a fallen house of God.

I.—THE ECCLESIASTICAL BUILDINGS.

I shall now endeavour to represent, as far as I am able to reproduce, the old abbey with its edifices and inhabitants, their habits and uses, in full vigour and activity.

The Minster, 161 feet in length, was of the purest and most severe type, like Roche, Grey, Sweetheart, Buildwas, Valle Crucis, and Beauport, regarded by M. de Caumont² as a model French abbey of the earliest part of the thirteenth century. A few fragments of opaque glass which have been exhumed, and narrow lancets in the nave, aisle, and transept, suggest a sombre interior. The walls were coated with plaster, marked in red lines to represent courses of masonry. The floors were covered with heraldic and geometrical patterns, laid in combinations of circles, or walks lined with a green edging. They exhibit the arms of Mohun, Poyntz, Trivet, Montacute, Raleigh, Carew, Paulton, Randolph, Fitz-Nicholas, Peverell, Furneaux, Beauchamp, Clare, Bridport, Lacon, Aynesford, Poyning, Pollard, and St. Loe ; some of which are found also at St. Decuman's and Leighland, and portrayed in the Bristol volume of the Royal Archæological Institute. There are also floriated patterns, as at Muchelney, a greyhound, a hippogriff, a wyvern, an eagle displayed, birds among foliage, two lions combatant, roses, and fleurs-de-lys.³ The roofs had cresting tiles. The footstalls of the pillars in the nave and transept were polygonal, those of the nave are round. The church seems, with the conventual buildings, to have been completed before the last quarter of the thirteenth century, beginning as usual from the east end where the walls were 6 feet 4 inches thick ; whilst in the nave they do not exceed 4 feet.

The NAVE, which formed in its western portion the Choir of the Converts,⁴ measured 140

¹ I am indebted to him for the carefully measured ground-plans which illustrate this paper.

² *Abecedaire*, p. 26.

³ Some of these are engraved in the *Building News*, Jan. 14, 1875.

⁴ *Rituale Cisterc.* lib. I. cap. iii. § 5. The Statutes, 1191, distinguish *chorus conversorum* from *chorus proprius*, being divided by a screen (*clausura*). Martene, *Thes.* iv. 1272, 1647 ; *Chron. de Melsa*, App. p. lxxxii. "*Stalli superiores et bassiores Conversorum in occidentali parte ecclesiæ*" (*MS. Chron. fo. 240*) ; "*Chorus Conversorum coram crucifixo*" (*Chron. de Melsa*, iii. 37) ; converts communicated before the rood (*Ordin. Cisterc. c. lxi.* ; *Rock. Ch. of our Fathers*, iv. 80). L'Abbé Moyne thus describes Senauque :—" Les frères du chœur occupaient la partie rapprochée du sanctuaire ; le reste jusqu'au mur de façade était réservé aux frères convers qui y accédaient par le bas coté des étrangers [at Clairvaux they had "*stalles placés au bas de la nef*"] ; les hotes entraient par la porte du collatéral de gauche réservée aux

by 60 feet, and, like that of Valle Crucis, was of five bays; portions of the two western pillars and halves of the central pair, where the screen between the retro-choir and converts' choir stood, remain, with the base of the west wall, and the entire south wall with portions of the PROCESSIONAL DOORS; the one to the east retains its jambs.¹ Each AISLE was 11 feet broad; on the south side there are the sills of narrow windows (pierced in the thick wall, and capable of admitting only a dim light), 14 feet above the level of the floor, which at the west end has a noble specimen of encaustic pavement.

THE RITUAL CHOIR, 40 by 20 feet, afforded ample accommodation for the twenty-eight monks who are known to have formed the community at the close of the thirteenth century.² There were only seventeen at the dissolution. As at Croxden, Fountains, Valle Crucis, Melrose, Buildwas, and Strata Florida, the choir was prolonged into the nave. Here it extended half way over the crossing, and into one entire bay of the nave, westward, where the base of the ROOD-SCREEN remains, together with the basement of the lateral stone parclose; against which were ranged the upper stalls (*formæ*) with folding seats or misericords; and below them the seats of the Novices (*Stalla chorûs Noviciorum*). The abbot sat on the right side, and the prior on the left next the screen. Outside of the latter was the retrochoir, or Choir of the Infirm, which, like the choir, had a hanging lamp. It was literally behind the choir when the monks faced eastward, directly to the church front. A second screen with altars of St. Mary and the Dead parted the retrochoir from the nave or Choir of the conversi.²

The Cistercians had a high choir (superior chorus) between the rood-screen and the lectern which stood in the centre; and a base-choir, used in Lent and on Whitsun eve, extending from this desk to the presbytery screen; the former was entered from the west, and the latter from the east, "*inter gradus presbyterii et stalla chori*," according as the service was said in either division. Priests sat in the upper range. The abbot and prior always entered through the door of the screen, as did the monks if the seniors sat in the upper choir. Tierce was said in the upper, but all the other Hours³ were sung in the lower choir.⁴ The chanters' seats were in front of the pulpit or desk. At mass the upper choir was used.

At Valle Crucis⁵ the side-screens of solid work were built up in the first bay of the nave or retrochoir, westward of the rood-loft, and a procession-path was made midway athwart the central space under the lantern into each wing of the transept, as at St. David's. The unusual arrange-

hommes. La porte du collateral de droite souvroit extérieurement pour donner entrée aux femmes, mais elles restaient renfermés dans le bas côté." At Senauque the cloister was on the north side. Women were allowed admission only on feasts of the dedication. MS. Harl. 3708, dist. iv. cap. 1. They were screened off by parcloles.

¹ There was no Galilee porch as at Fountains, Byland, and other places. As the origin of the name has been a vexed question, I may solve it by the following from Rupert of Dietz:—"Singulis Dominicis (à Primâ Sabbati quâ Dominus resurrexit, dedicatis) hoc nobis processionis ordine significamus quod in Galilæam, *i. e.* in transmigrationem ad videndum Dominum cum Apostolis Ejus exire debeamus. Unde semper in hujusmodi processionibus prælatos nostros præeuntes quasi Dominum in Galilæam sequimur, et locus ipse quo processionem supremâ statione terminamus rectè à nobis Galilæa nuncupatur." (De Div. Off. lib. v. ch. 8; apud Hittorp. p. 525.) There were three stations in solemn processions—(1) "*juxta dormitorium*;" (2) "*juxta refectorium*;" (3) "*in claustro collationis juxta ecclesiam*." (Rit. Cist. lib. i. c. xvii. § 12.) The east alley was *Clastrum capituli* (Ib. c. xi. § 4).

² MS. Harl. 6965, fo. 100 b. *Usus Antiqui*. P. iv. c. 99; *Rituale Cisterciense*, lib. i. cap. iii. § 3, 4; cap. xvii. § 4. The Retrochoir was a name used also by the canons of S. Victor. The words of the ritual are: "*more ordinis debet esse clausura separans chorum a retrochoro; navis similiter separatur à retrochoro*." At Fountains the rood-loft contained altars of St. Mary and Bernard. (Monast. Anglic. v. 288.)

³ Rit. Cist. *Primera Parte*, cap. xii.; *Usus Cist. lxxviii.*; Rit. Cist. lib. I. cap. v. § 3; cap. xvi. § 3; lib. III. c. xvii. § 4; c. xx. § 4; xxi. § 4. The lower choir was also called the Choir of Vigils and Vespers.

⁴ Rit. Cist. lib. iii. c. x.

Addit. MS. 29, 720, fo. 50; 17, 764 c. ff. 73, 106.

:OLD CLEVE:

INFIRMARY CLOSE



Black. Wall above ground.
Foundations.
Indicated

ment of a longitudinal choir-screen also occurred here, forming one side of a procession-path for the entrance of the celebrant and ministers, according to the ritual, into the presbytery.¹

THE CROSSING retains parts of the bases of the central tower, and a portion of tile-pavement. Once the walls themselves seemed vocal, as the monks raised their solemn chants in unison with such solemnity and devotion that to Stephen of Tournay it seemed as though angel voices were blended with the slow measured chant of antiphon and psalm.

THE PRESBYTERY, 17 feet E. and W., and 29 feet in breadth, was square-ended, as Willars de Honecourt drew his design;² it was aisleless, as at Sawley, Strata Florida, Grey, Valle Crucis, Buildwas, and Kirkstall; and short as at Jorvaulx and Byland, although there flanked by aisles. It contains a portion of a tomb of blue lias, and the foot of a step,³ which held a prominent place in the ritual. Fountains has an eastern transept; the two exceptional apses of Beaulieu and Croxden, followed the plan of the parent houses in France, Citeaux and Alnet. There is no trace of the sedes ministrorum.⁴ Here at an altar detached from the wall, so that it could be compassed, and clothed in linen or flaxen palls, the priest was vested in a chasuble of common stuff, and deacon and sub-deacon, in unorphreyed tunicle and dalmatic, were serving before it with vessels silver gilt, and censured from a thurible of brass. The Lent curtain hung across the presbytery-step.

THE TRANSEPT measuring 97 feet from N. to S., and 22 E. to W., had the usual eastern aisle divided into chapels; here there were two in either wing, as at Fontenay, Vaux de Sernay, Pontigny, Ourscamp, Senauque, Citeaux, Beauport, Netley, Buildwas, Jorvaulx, Byland, Bindon, Croxden, Roche, Balmerino, Hore, Gray, and Boyle; three occur at Kirkstall, Fountains, Furness, Rievaulx, Melrose, Dunbrody, Craig-na-managh, Aubazine, Clairvaux, and Waverley; each of them formed a square of 13 feet 6 inches. They were probably dedicated to St. Bernard and Benedict; whilst a third chapel, called in the Ritual "Sacellum Sacramenti," was for reservation. There was no alure or blind story; but the clerestory of two lancets in either wall of the SOUTH WING was standing about the beginning of this century.⁵ At the N. E. angle there is a skew-door on a level with the wall-space immediately above the marks of an arch which opened into the aisle-chapel. The base of the pillar and parclose remain. There is a similar door with four steps at Tintern in Ireland.⁶ The Cistercian sacristan did not sleep in the dormitory, but near the church, so that when the clock struck he trimmed the church lamp and that of the dormitory before he rang the great bell which aroused the whole community.

At Valle Crucis there is a passage⁷ from the muniment chamber over the sacristy, with an alure over the arches in front of the transept chapel, which led to a loop⁸ in the south wall of

¹ Lib. III. c. xvi. § 3.

² Maulbron, Vaux de Sernay, and Fontenay were square-ended. Beaulieu very closely resembles Pontigny.

³ One or two steps were required by the ritual. The epistle-lectern stood in the centre of the step.

⁴ Used at tierce and mass, and at the side of the altar. Monasticon, 732; Rit. Cistere. lib. I, c. iii. § 2. I have once found them called sedilia. In the south wall was a ministerium, or credence, for the altar vessels; near it was a locker for the oil of the sick. (Ibid. c. xviii.) Behind the altar, amice, albe, and girdle were laid for the priests who sang "Popule Meus" on Good Friday. (Ibid. iii. c. xxi. § 3.)

⁵ Grose's Antiq. 1754, v. p. 23; Collinson's Somerset, 1791, iii. 512; and Boswell's Pict. Views, 1787, pl. 100. At Fountains two of the chapels were dedicated to S. Peter and S. Michael, and at Croxden, to S. Benedict and S. Lawrence. (Monast. Angl. v. 601.) Beaulieu had three chapels on the north and two on the south.

⁶ Grose's Antiq. ii. 50.

⁷ Add. MS. 27, 764, ff. 54, 58. The sacristan's oriel still remains at Worcester, and his room communicated with the church at Durham (Rites, 81.) Canterbury (Benedictine), and Lichfield (secular). At Ourscamp the treasury was over the sacristy.

⁸ Spying-pipes, or squints, are found in the oratory of the Prior's Chapel, Canterbury, where two command views

the Presbytery, probably for watching the perpetual lamp of the Oratory or Presbytery,¹ which, with the single taper set in an iron candlestick at the lectern, feebly showed the pale dresses of the brethren amid the obscurity of the interior during the night-office, in which matins lasted through two hours, and lauds commenced at dawn. There was also a second ever-burning lamp before the reserved sacrament, at a low altar, for the communion of the faithful, or of monks who could not attend high mass. It adjoined the revestry or sacristy.²

A portion of a quatrefoiled ablution drain (the Cistercian *sacrarium* or *piscina*), with the base of an altar $5\cdot10 \times 3$,³ remains in the S.E. chapel. On the west side is the door of the inner or night stairs used by the monks in going down to the Vigil-office, as at Bindon, Beaulieu, Kirkstall, Furness, Jorvaulx, Tintern, and Netley. At Fountains⁴ they were at the west end of the nave, which the dormitory, still marked by its gong, adjoined. At Grey, a newel formed the communication with the church. Two pleasing instances of the piety of founders are on record in relation with such stairs at the neighbouring abbey of Ford. John Courtenay, a great benefactor, was on his way home from foreign lands, crossing the Channel in a dreadful storm at night. It wanted but a little time to dawn when his crew lost heart and refused to battle any longer with the waves and the wind. He thought for a moment, and then cried out, "We are in great peril of shipwreck; up, and work like brave men; be of good cheer, one hour more and my monks of Ford will be rising to keep their vigils, and pray God for me and those at sea."⁵ And so, because he knew that the bells were ringing for matins at Vaudey and Meaux, William le Gros, Earl of Albemarle, averred that he always slept soundly at cock-crow whether he were in his tent or on the broad seas.⁶

In the NORTH WING there is the platform of the altar of the south-eastern chapel; the basement of another, $9\cdot7 \times 3$ feet, in front of the dividing pillar, appears to have been connected with a large sepulchral slab of blue lias of the fourteenth century, resembling a cenotaph, for it has neither inscription nor arms upon the heater-shaped shield, its only ornament. It is 6 feet long, 5 inches thick, and 2 feet wide at the head, and only 14 inches at the feet. It scarcely rises above the floor, but solid masonry surrounds it; and it is quite possible that a Perpendicular

of altars in the transeptal chapels, and two look towards the choir-screen and a space westward down the aisle. (*Archæol. Cant.* vii. 70.) A spying-pipe once communicated between the upper treasury and south wing of the transept at Worcester. (*Arch. Inst. Jo.* xx. 266.) M. Bonet suggests that the door may have opened on an upper room over the chapels for the accommodation of monks who were too ill to attend the offices.

¹ *Lyndw. Prov. Const. Othob.* p. 153; *MS. Harl.* 3708, dist. iii. c. ii. fo. 18 b; *MS.* 11, 298, c. xi., xii. fo. 42.

² "Altaria sint IV. circiter pedum altitudinis et latitudinis et V. vel VI. longitudinis. Majus autem habeat IX. vel X. pedes in longitudine." (*Rit. Cist. lib. II. c. i. § 2.*) Before this altar the procession made a halt, or station, whilst the celebrant took from it the reliques. (*Usus Cisterc. cap. liii.*) For the drain, see *Rit. Cist. lib. iii. c. xv. § 5.* The "*Sacellum Sacramenti*" occurs in *Rit. Cist. lib. iii. c. xx. § 19.* ³ *Rit. Cist. Primera Parte, c. iii. § 1.*

⁴ *Buckler's Hist. of Cist. Arch.*; *Add. MS.* 27, 764 B, ff. 62, 70; *ib. C.* ff. 7-12; *Burton's Plan in Monast. Eborac.*; *Walbran's Mem. Surtees Soc.* xlii. *Pref.* lxv. pp. 129, 136-7; *Tourist's View of Ripon*, 1833, p. 65; *Hist. of Ripon*, 1806, p. 198; *John Carter, in Gent. Mag.* 1806, lxxvi. 625; *Gent. Mag.* 1815, lxxxviii. p. ii. 584. For the Guest House theory see *Trans. R. I. B. A.* 1871, p. 199. The substructure at the northern end formed chequers for offices (with a forecourt in front), and, to the south, a granary or wool-store. In the length of their dormitories, as proportionate to the minsters, Cleeve exceeds Fountains; and long before converts were admitted, Fontenelles in the 8th century had a dormitory measuring 208 ft. long by 27 in breadth. The Benedictines built the dormitory on this side at Durham and Worcester, the Cluniacs at Wenlock, and the Austin Canons at Ch. Ch. Twyneham. Durham and Fountains bore a very close mutual resemblance in the position of the dormitory, the nine altars, and longitudinal western Galilee.

⁵ *Monasticon*, 797.

⁶ In a more practical spirit the Mercian king bequeathed the cup from his own table to the Benedictines of Croyland, "that the old men of the monastery on saints' days might drink from it, and in their benisons sometimes remember the health of the donor, Witlaf." (*Monasticon*, 166.)

closure, of which numerous fragments of delicate tracery have been found, may have screened, at a late period, what appears to be the memorial of Sir Gilbert de Walleys, or, as he was usually called, de Woollavington, a great benefactor to the abbey,¹ who, in 1298 founded a chantry here, to be served by two additional chaplain monks.²

The upper or eastern cemetery, on the north side of the church, with a long line of graves, and one half dug and left open for the next inmate, served for the interment of monks, and another burial-ground adjoining it for lay persons : stranger abbots were laid eastward of the presbytery, whilst kings and benefactors only were admitted to their long home within the church.³ The dying monk was laid upon his blanket, on the ground strewn with ashes in the form of a cross and with straw : then the tablet was sharply and quickly struck in the cloister, and all the brethren ran to the dying man saying the Creed. When the soul had passed the chanter said "Subvenite."⁴ In the bath house (lavatorium) of the Infirmary, the dead was washed with hot water scented with fragrant herbs, and at once carried on a bier to the parlour, and thence to the church,—the abbot into the presbytery, the monk to the midst of the choir, and the convert into the nave. In the church the departed lay with watchers and lights around him, and then, after mass and a decent period, was laid to rest under the shadow of a wooden cross erected at the head of his grave.

I found some letters of this date on tiles, and being grouped they formed the inscription H(ic) C(onditur) · GI(l) · B(ertus) · D(e) · W(O)LAUYNT(N) · M(iles) ; moreover, one tile of far larger size than the rest represents a knight charging in the tourney,⁵ possibly the friend of Cleeve ; for one, I should like to think so, and believe that, though awhile forgotten,

" The memories of the just
Smell sweet and blossom in the dust,"

for their works of piety cannot be hid.

II.—CONVENTUAL BUILDINGS.

We may contrast with the religious care of the Then and Now, the days when the ancient minster, long since dismantled, became decayed and at length a quarry. Even within a few months ago, pigs squealed in the cloister, calves fed in the sacristy, hides reeked in the parlour, carts and lumber blocked the chapter-house, straw was piled in the calefactory, and grain choked the dormitory ; a cider-press thrust up its unsightly head through the floor of the refectory, an unsavoury stackyard filled one half of the garth which a vile wall bisected ; a loathsome ooze blackened the waters of the spring, and all lay "uncomely and fulsomely," "defiled with rain and weather, with dung and other filthines," as the old homilist wrote two hundred years ago, "as it is foul and lamentable to behold

¹ Inquisit. p. m. I. p. 151. It is, I fear, necessary to state that all monks were not priests, the majority being laymen, and also to point out that the whole arrangement of a conventual order, whether of monks or canons regular, was wholly distinct from that of a church served by secular canons who were all in orders, and had separate households. For the Chantry, see Journal of Brit. Archæol. Assoc. Dec. 1875. M. Bouet says that the tomb of S. Etienne, the founder of Aubazine, remains there "dans le transept de droite." ² Comp. Ann. de Wigornia, s. a. 281.

³ Jubainville, i. c. 4 ; Rit. Cisterc. lib. I. c. iii. § 9. "Tumuli defunctorum in claustris," that is, in the east alley (not, as incorrectly stated, in the garth) are mentioned. MS. Addit. 11, 298, dist. x. cap. 23, fo. 94 b.

⁴ Rit. Cisterc. Quarta Parte, cap. viii. § 2 ; Usus Cisterc. fo. 305 ; Rit. Cisterc. lib. i. c. viii., ix. ; lib. vii. c. viii. § 7 ; MS. Harl. 2793, ff. 79 b. 80 b. Usus Antiq. P. iv. c. xcv.

⁵ In the Inventory of Westminster Abbey, 1369, now at Canterbury, a cope is mentioned, "cum hominibus super equos equitantibus in modum hastiludii ludentibus." (P. iv. c. xii.)

in many places in this country;" as it is, also, I fear, to this very day. Here, however, from a scene of wreck and ruin which the tenderest care can only soften in its painful if no longer repulsive aspect, we pass into the centre of a group of conventual buildings, the least undefaced, the most complete that have been spared to us. Being Cistercian, their anomalies invest them with still further interest. The Order had no obedientiaries and special chequers like the Benedictine, the principal officers were the prior, cellarer, vesturer, refectorar, chanter, and hospitaller. The kitchen was served by a hebdomadary of that department. In the enumeration of the buildings of Rievaulx, we find them in this order—the chapter-house, the dormitory, the refectory; of sufficient size, and of other materials, the necessary houses, the infirmary, the cellarge and hospicium (the guest-house), the bath-house, stables, granary, barn and mill.¹

At Newenham the architectural notices are these—before 1308, "*fecit claustrum versus Infirmary monachorum; Lavatorium; incepit novum Refectory. Fecit etiam panella in claustro.*" and before 1318, "*fecit novam Coquinam novo refectorio contiguam.*"² The annals of Waverley mention—"Infirmitoryum secularium" and "*capella de Infirmitoryo.*"³ Giraldus mentions "*Hospitum aula communis.*"⁴

The inventory of Dieulacres, with thirteen monks and twenty-eight servants, at the suppression, includes the cloister, chapter-house, dorter, frater, and fermery, the corner chamber, ryders' chamber, butler's chamber, the hall, buttery, larder, kitchen, brewhouse, boulting house, and labourers' chambers.⁵

At Hayles, with twenty-two monks, we have the abbot's lodging extending from the church to the frayer southward, with pantry, buttery, kitchen, larders, cellars, and the lodging over the same; the baking and brewing houses, and garner; the gatehouse, the great barn, two stables, the outhouse and sheephous; the church, the cloister, chapter-house, dormitory, and frayer, the infirmary, with chapels and lodgings to them adjoining; the prior's chamber, and all other chambers belonging to the officers there.⁶

The inventory of Merevale, which had ten monks and forty servants and three kitchen-boys, includes the church, the vestry, the cloister, and the chapter-house; the hall, the buttery, the chief parlour, the inner parlour, the great old chamber, the chamber next the old chamber, the chamber called the Bredonnes, the white chamber, the porter's chamber, with other servants' beds; the kitchen, larder, brew-house, malt-house, bake-house, lime-house, and smithy.⁷

At Whalley the buildings enumerated are the hostelry, with the chief chamber and parlour beneath, the better and other gallery; the middle and lower bishop's chamber, the Lady chamber, the king's chamber, the abbot's chamber, the dining chamber, the buttery, brew-house, bake-house, abbot's kitchen, covent-kitchen, little chamber in dorter, the little revestry next unto the library, the foresaid little revestry next unto the gallery, and the store-house.⁸

In the English Cistercian Ordinal, cap. l. lxi., these buildings are mentioned, *claustrum, oratorium, capitulum, dormitorium, calefactorium, refectory, coquina, auditorium [parlour], and cella hospicii.*⁹

¹ Monasticon, 731. The ritual mentions "*Clastrum et officinæ scil. capitulum, auditorium (parlour), dormitorium et dormitorii necessaria, calefactorium, coquinam, refectory et cellarium.*"—Lib. i. cap. xx. § 10.

² Arundel MS. xvii. ff. 55, 56 b. This notice of the infirmary in connexion with the cloister (as in Rit. lib. vii. c. viii. § 7) leads me to believe that it stood, in the first instance, in close access to the church, on the west of the garth, as M. de Caumont says was the case in several French abbeys. (Abeced. p. 42.) The *Sacellum Infirmitoryi* was of far later date than the choir of the Infirm, to which the western stairs would give convenient access.

³ Ann. Monastici, ii. pp. 305, 253.

⁴ Spec. Eccles. dist. iii. c. xiii.

⁵ Augm. Off. Books, 172, f. 41, printed in my paper in the Archæologia, vol. xliii.

⁶ Augm. Off. Books, 494, fo. 71.

⁷ Augm. Off. Books, 172, ff. 5, 6.

⁸ Chapter House Books, A $\frac{3}{12}$ ff. 181-3.

⁹ Rock. Ch. of our Fathers, iv. pp. 79, 86.

At Croxden, in 1242, the abbot builds “*portas monasterii, medietates ecclesiæ, capituli, refectorii, coquinæ; dormitorium, diversorium [the guest house], infirmitorium et claustrum ejusdem, probatorium [the novitiate], et alias domos.*” Then mention is made of “*dormitorium monachorum cum domibus sibi contiguïs, thesaurariæ, et necessariarum, ac etiam dormitorium abbatis; nova camera abbatis inter coquinam infirmitorii et dormitorium, camera abbatis superior et inferior;*” and “*domus quæ vocatur Botelston quæ cecidit ab ecclesia usque ad hostium aulæ.*”¹

At Meaux we find “*hospitium, camera abbatis, camera prioris, officium sacristæ, officium refectorarii et cellerarii, officium and capella infirmitorii, officium and camera portarii, studium camerarii, camera pistrini, domus juxta cimiterium, coquina et domus inferiores officinæ, camera infra dormitorium,*” and “*domus fabri, carpentarii, et plumbarii.*”²

This list, fragmentary as it is, will guide us surely in our survey. We have no materials at hand, such as annotated plans, distributory schemes, and local dissertations, which we possess for elucidating Benedictine houses, and must be content even with these scanty lights.³

The CLOISTER GARTH is here, as usual, on the sunny south side. The abbot alone, when going to chapter, was allowed to cross it. At Tintern, Ford, Dore, and Buildwas, as at Melrose, Balmerino, and in several French abbeys, the necessities of the site placed these buildings to the north of the church.⁴ A pentice-walk, with the roof supported on pillars, once extended round the whole court, the corbels remain. The cloister, or integral part of the church, gave name to the whole convent; here between matins and lauds, and between mass and sexts, the meridian and nones, if not engaged in silent meditation in church, the monks assembled; the novice learned his psalter; the chanter taught his pupils in a low voice, and the studious read.

To the eye of the monk the cloister, now desolate and sad, when full of human life represented the heavenly paradise, where there is but one heart in loving God, and all things are in common. The central garden, its pillared arcades and springing fountain, and the surrounding chambers, “the chapter-house, the refectory, the cellage, the dormitory, and chapel,”⁵ taught severally spiritual lessons to those who knew the mystic language of the age. The whole area of the court requires to be levelled, as at present only the bases of the pillars and steps have been exposed to view.

THE EAST ALLEY is pure Early English. A door in the south wall of the transept, lately walled up with loose tiles, now opens into the SACRISTY, or revestry, 22·4 × 12 feet, well developed, as at Grey, Valle Crucis, Whalley, and Bindon. It contains two aumbries, with marks of the ledges for the reliques⁶ in the west wall; a recess for the towels, and the laver [*fons lavatorii*],⁷ which were used in washing the hands before and after mass; an aumbry in the north wall; and facing the east, a circular window, 7 feet in diameter, which once had a foliated inner moulding. The vault retains some bands of colour.

THE INNER OR REGULAR PARLOUR was formed by the next chamber, which has, like the last, a barrel vault, and is lighted by a single lancet. It was used for conversation “in few and grave words”⁸ upon conventual business, when silence was imperative in cloister, or at set hours between

¹ Chron. Faust. B. vi.; p. 1, f. 74; 83 b; 86 b; fo. 75 b; fo. 90.

² Chron. Tib. c. vi. 233–242.

³ The Norman plan of Canterbury, the Rites of Durham, the allotment of houses at Worcester, the custumal of Westminster, the map of Chester at its dissolution, and early chapter-books.

⁴ See my Sacred Archæology.

Durand, i. c. i. fo. vii.

Rit. Cisterc. lib. i. c. xviii. § 4.

⁷ Rit. Cist. lib. vii. c. v. § 12 c. vi. § 14. The “piscina.”

⁸ Rit. Cist. lib. iv. c. xi. § 4.

friends. In place of this room at Clairvaux,¹ Kirkstall, Beaulieu, Croxden, Grey, and Tintern (where a niche-like aumbry adjoins it), the western half of the sacristy is walled off, and being open to the cloister, served as a library for books used in the time of reading, and also as a parlour. Cleeve possessed both these chambers. At Furness there are two open chambers adjoining the portals of the chapter-house, whilst at Valle Crucis there is a small closet or carol, with a traceried window on one side, and on the other side of the entrance are the day-stairs. These rooms have been absurdly called penance-chambers, just as butcher's broom is popularly said to have been planted also in the vicinity to provide scourges for flagellation. The small sequestered cells used for solitary confinement may be seen at Fountains: the conventual prisons were required to be "firmus et fortis carcer."²

THE CHAPTER-HOUSE, as at Ford, Sawley, and Whalley, is an oblong and, unlike the usual Cistercian arrangement, is not divided into three alleys. The only other exception is that of the polygonal chapter-house of Margam.³ This noble room was 46·10 feet long × 24·4 broad. The eastern bay, which projected under the muniment-room, has been destroyed; the walls had, according to Grose's view, two lancets, one above the other, on either side; the walls are now pared down to the semblance of buttresses. I have built up a dry wall upon the foundations to mark out the original form. The two bays, which are preserved, measure 21 ft. 4 in. N. and S. × 23 ft. E. and W. They have quadripartite vaulting, which springs from the low shafts, and is relieved in red colour, with bands of half-diamonds within semicircles of foliage, which have oval ornaments at the points of junction. The portal as usual, in order to permit an unimpeded view of the interior from the cloister, consists of a large central arch, with voussoirs red and white in natural polychrome, flanked by an unglazed window on either side, which is supported laterally by graceful brackets, and divided by a central shaft of blue lias. This triple arcade occurs also at the entrance in Buildwas, Calder, Beaulieu, Croxden, Fountains, Furness, Whalley, Netley, Balmerino, and Dun-dreman.

Particoloured stripes of masonry were used as in the Benedictine chapter-house of Worcester.⁴ A few fragments of tile pavement remain. Immediately after Prime had been sung, the monks sat along the side-walls, where the platforms of their stalls are seen, with the novices on footstools below them; the abbot's central chair set on the east side, faced the round orifice in the floor, into which the lectern was embedded.⁵ Here were read the martyrology and rule, followed by a short service, the commemoration of the faithful departed, sometimes a sermon, and often by open confession of any infraction of the rule by proclamation of faults by an eye-witness, and by penance and bodily discipline. Here, too, the abbots were interred under stones even with the floor, or in the adjoining cloister alley.

The next archway is that of THE DAY-STAIRS TO THE DORMITORY, which again are in conflict with

¹ In a beautiful plan of 1708, traced for me by M. Bonet, among others of Cîteaux, 1674, Ourscamp, Senaueque, and Aubazine. See *Usus Antiq.* P. iii. c. lxxi., lxxiv. [Migne, clxvi. 1446]. It had a light.

² MS. Addit. 11298, dist. vi. c. xii. fo. 73. There were two prisons: Carcer (1) ad reatorum custodiam, (2) ad pœnam, being the ergastulum, or locus carcerosus. (Lyndw. Prov. Const. Othob. t. iii. p. 83; tit. xxxix. p. 143.) M. Bonet, speaking of Ourscamp, says: "Suivant l'usage de Cîteaux la bibliothèque était placée entre l'église et la salle capitulaire. La petite pièce placée à côté de cette salle dernière le Parloir est indiquée comme prison, ce qui me semble n'avoir pas dû être sa destination primitive, d'autant plus qu'elle communique par une porte avec le chapitre. Je croirais plutôt que c'était le chartrier, cette pièce était bien close et ayant ordinairement des fenêtres fortifiées de barres de fer." Two persons were allowed to converse in the prior's presence [*Us. Ant.* P. iii. c. lxxv. § 4.]

³ The Benedictines had two of this form at Westminster and Worcester; and the Austin Canons three, at Bridlington, Thornton, and Bolton. See my *Sacred Archæology*, s. v. Chapter House.

⁴ *Jo. Arch. Inst.* xx. p. 97.

⁵ *Rit. Cistere.* lib. iii. c. viii. § 3, analogium in medio positum.

the usual arrangement, being placed here in the centre of the alley, and not at its end, as at Beaulieu, Whalley, Netley, Grey, and Vaux de Sernay. At Valle Crucis their position corresponds with that of Cleeve. The dormitory was accessible whenever access was required.¹ The stairs were used by the monks for changing their night-dress between lauds and prime, after washing at the lavatory; or when going up to their meridian or noon-day sleep, which lasted about an hour, after they had sung the Miserere and said grace in the minster after dinner; and again after compline and "collation" (reading from the lives of saints, or lections of the Fathers) on retiring to rest at 7 p.m. There are twenty-three steps. The entrance is formed by an Early English arch, which has been tampered with in the Perpendicular period, by being slewed or corbelled above, when a doorway midway was also built to modify any draughts of cold air. The jambs had shafts of blue lias. At Fountains these stairs were placed near the porter's lodge.

THE CLOISTER AUMBRY OR LIBRARY has one corner cut off to admit the steps. It is well defined, as at Sawley, Croxden, Louth Park, and Whalley, and measures 16.11 × 11.7. A large aumbry is constructed under the stairs. There is a second locker in the south wall which corresponds to the "common aumbry, with recesses over the door of the cloister" at Meaux.² All the books were in charge of the sacristan. The east wall is pierced by two large lancet windows. This chamber at Valle Crucis is on the opposite side of the slype. It may have served also as the third parlour for confessions,³ mentioned by Lenoir.

THE SLYPE, 30.8 × 6.2, is a vaulted passage with two double aumbries on the south side, and two pairs of lockers in the north wall; they were probably used by the monks to deposit books or other articles when they passed out on their way to field-work, which lasted in the interval between chapter and tierce, followed by the daily mass; and again between nones till half-past five, when vespers were sung.

Peter de Blois says that prælections were read in the east alley by the Cistercians; and Abbot Over, at Croxden, made lockers [almarium] for the books, and was buried outside the church door near the scamnum, probably the bench on which they were laid out for use.⁴

In the curtilage on the east the MONKS' INFIRMARY⁵ probably stood, as at Clairvaux (where it had a large cloister garth), Whalley, Kirkstall, Fountains, Rievaulx, and Louth Park. At Furness and Croxden it lay southward of the calefactory; and at Buildwas, having a small cloister on the east of the calefactory, is in immediate connexion with the cloister.⁶ At Fountains John of Kent

¹ Martene, *Thess.* iv. 1224. During the whole "Time of Reading," that is, when not occupied at church, labour and meals, or asleep, the monks were allowed "sedere in cellis suis" (*Rit. Cisterc. lib. iv. c. i. § 1*), and in summer between dinner and nones. (*cap. v. § 17.*)

² Cotton MS. Vitell. c. vi. fo. 240. It may have been also a Writer's room.

³ Monks were required to confess once in six months (*Lyndw. Prov. p. 232*). At a late period they confessed on thirteen occasions in the year, but in early times once a-week, in the chapter-house or church.

⁴ *Chron.* p. 79, or, it may have been, "illa Scampna ubi conventus ad collacionem solet sedere, ad illud hostium ecclesie ubi monachi solent exire de ecclesia in claustrum;" it was used as a seat for the poor at the maundy washing of their feet (*Ordin. Cisterc. Rock, Ch. of our Fathers, iv. 85*). The ritual requires the books to be placed in "armariis ac loculis in cellâ ad hoc deputatâ, obseratâ et mundâ." [*lib. vii. c. vii. § 1.*]

⁵ De Caumont, *Abec.* 43, and *Chron. de Melsâ, III. 86*. M. Bouet writes to me, "Dans l'abbaye d'Ourcamp existe une belle Salle à 3 nefs voutées, qui est connue sous le nom de Salle des Morts. A Clairvaux il y a aussi une pièce indiquée sous le nom de Salle des Morts ou Infirmerie. La Belle Salle des Morts d'Ourcamp est placée au sud-est de l'abbaye. J'ai souvent rencontré les Infirmeries, placées à cet endroit." M. de Caumont says, "Les logemens des Infirmes (domus Infirmorum) étaient habituellement en dehors du carrée principal" (*Abec. pp. 43, 52.*) At Meaux the Prior's house adjoined it.

⁶ Add. MS. 27, 765, fo. 24. At Buildwas it was of two alleys. A chapel is mentioned at Waverley (*Ann. de Waverl. II. 253*). The *Ancient Use* mentions ostia noviciorum, infirmorum, et scriptorium. (*P. v. c. 116.*)

built a new cloister and infirmary, as William de London did at Croxden.¹ At Cleeve there are signs of a pentice roof along the walls of the calefactory like the alley of a cloister, and outside the east arch of the slype there was a porch. The Cistercian infirmary, which at Fountains and Whalley had a lateral chapel,² consisted of a long nave with aisles filled with beds, or furnished with chambers as at Meaux, and has hitherto escaped notice, having received the erroneous appellation of the "Abbot's Hall." At Furness the chapel had only a small door to the hall, unlike the Benedictine arrangement of Ely, Canterbury, and Peterborough. Pipewell³ had infirmaries for laymen, and, as at Meaux, for converts.

THE CALEFACTORY⁴ is entered by a round-headed doorway in the south wall of the slype. It measures 60 × 22 feet 6 inches, and formed the "cella communis" with a fire-place, from which it derived its name. The dimensions of the Cistercian chamber, which has been erroneously described as a fraternity [a name like Freytoure and Fraterhouse, appropriated to the refectory alone, as at Carlisle to this day], far exceeded the modest size of the Benedictine Common Hall, which was set apart wholly for recreation. Here its uses were many. A lamp was lighted in it after the night hours, and it formed the shaving house.⁵ Work was carried on within the cloister, or else so near it, that those employed could easily attend the hours, the true "Opus Dei."⁶ Sometimes, part of it formed the Novices' Hall [Cella Novitiorum]. The monks came to the Calefactory to grease their boots, to warm themselves, and to be let blood. The chanter and writers there smoothed the waxen tablets, liquefied ink, dried the sheets of vellum; the sacrist came for a light for the lamps and tapers in church, or fire for the censers.⁷ For these various purposes the magnificent chambers of Neath, Waverley, Tintern, Kirkstall, Louth Park, Whalley, Merevale, Fountains, Croxden, Sawley, Buildwas, Rievaulx, and Ford, were required.⁸ Here it was divided into two broad alleys of three spans by two central pillars, supporting quadripartite vaulting, which at either end rested upon groined ribs rising from carved brackets. In the south wall are two unglazed couplets of round trefoiled arches, with quatrefoils in the heads, and shafts of blue lias resembling some in the palace hall of Wells, whilst the actual wall was once pierced with two couplets under quatrefoils, which only in part remain. A door in the S.E. angle opened into the LOWER GONG, another opposite to it led into the Convent Garden, towards which windows

¹ Walbran's Fountains, 126, 134. Cotton MS. Faustina, B. 6, s. a. 1242-68.

² Rit. Cist. lib. v. c. viii. § 5.

³ Monasticon, 815.

⁴ It will be remembered that conversation was maintained in Latin and French in monasteries in order to promote silence; guests, as a matter of course, were addressed in English. Possibly this room is "the Hall" of later Inventories. I can trace its original in the *Caminata Fratrum et Domus major cum Camerâ et Caminatâ* at Fontenelle, in the close of the 8th century, which took the place of the less convenient hypocaust (*calefactoria*), and upper chamber of S. Gall. (*Chron. Fonten. c. xvi. D'Achery, Spicil. t. iii. pp. 230, 240*), and immediately adjoined the Dormitory and Refectory. Its French name is *Chaufoir*; the Spanish is *Calefactorio*. See Rit. Cist. lib. iii. c. xxiv. § 6, 7; iv. c. xi. § 3; v. c. viii. § 4. This chamber has been erroneously called the Fraternity, a pure invention; the "Freytoure, Refectorium" of the *Promptorium Parvulorum* appears in the local name of the Frater House of Durham, in the well-known Rites, c. xxxix. p. 68. *Fratria*, or *Frateria*, is a synonym for *fraternitas*, a brotherhood (*Hittorp, lib. iv. p. 297. Torriano, s. v.*). The Calefactory is mentioned in *Us. Antig. P. iii. c. 122*, and *V. c. 117, 118*.

⁵ Rit. Cist. Seg. Parte, cap. x. Rit. Cist. lib. iv. c. xii.

⁶ Stat. 1157, c. xxix.

⁷ Martene, Thes. iv. 1224. *Consuet. c. lxxi. Addit. MS. 18, 848, fo. 46, b.* M. Bouet says of Senauque, "Selon toute apparence, Le Scriptorium était cette salle basse qui occupe l'angle opposé à l'église, deux cheminées très vastes y entretenaient une douce chaleur. Généralement dans les convents de Cîteaux la bibliothèque se trouvait entre l'église et salle Capitulaire. A Senauque elle ne pouvait être que dans cette pièce à la fois Bibliothèque, Scriptorium et Chaufoir." I exhibit plans of Senauque, Ourscamp, and Aubazine.

⁸ It supplied the shelter which was afforded by the Benedictine Cloister with screened panels, sometimes, as at Peterborough and Durham, fitted with beautiful glazing; or in the humblest and earliest form, having apertures fitted with close lattice-work, as at Canterbury and St. Alban's. Clairvaux had two cloisters of wood.

once looked like those on the south, and unglazed, for the early race of Cistercians lived, ate, and slept almost in the open air. The east wall contains a similar window, a central fireplace, and a principal doorway towards the inner court.

THE DORMITORY extends over the entire eastern range of buildings, to the great length of 137 feet, with a breadth of 24·5, lighted by thirteen lancets on the west, two being crowded together where the Refectory abuts upon it; and by eight on the east, once broken in continuity by the TREASURY and MUNIMENT ROOM which was built over the eastern bay of the Chapter House, as at Netley and Furness; and is mentioned at Croxden in direct connexion with the Dormitory. Part of the doorway, shorn of its arched top, and three steps still remain near a fireplace and flue, a luxury introduced in the fifteenth century.¹ Some of the window-seats which face each other, retain their tiles. The roof unceiled showed its rough beams, and no glazing filled the open lights. [At Fountains, the whole length was divided into forty cells by wooden partitions, and with doors provided with a sliding panel which the superior could withdraw in his rounds. A passage was left down the middle, lighted by a large window at the south end, and during the night by a great cresset or lamp, from which the monks lighted their candles].² The beds were of straw, over which was laid a rough woollen cloth, and a rug-like coverlet sufficed for the sleeper, who lay in his cuculla or scapular and tunic, with stockings on his feet. The cuculla was a frock like a close cope with large sleeves, white at home, and grey abroad; the scapular was black, broad over the shoulders, and narrowing to the feet; it had a conical cowl.³

In the N.W. angle is the doorway to the NIGHT STAIRS with its original bolt of wood, and a chamfered jamb to allow the procession to slope inward. At the extreme end of the southern portion or DORMITORY OF NOVICES, which has lost its floor, there is a fireplace near a square-headed window; and in the S.W. angle is constructed the door of the UPPER GONG, or Latrine, with a skew window. The arch is so ingeniously constructed, that the door travelling on a spindle always left half of the aperture open. The necessary house, or private dorter, partly remains at Croxden, Fountains, Netley, Rievaulx, Furness, Boyle, and Whalley, and may be traced at Louth Park. The roof is of a lower pitch than the original, and quite modern, like the hideous wall that bisects this noble room, and like the barn floor in the Calefactory, which are to be removed.

THE SOUTH SIDE OF THE CLOISTER has suffered some alterations in the Perpendicular period. The labels of the doorways and the lavatory, and the lower portions of the wall are Early English, whilst the sub-arches of the Undercroft are Late Perpendicular. On the east side is a TRESAUNT, or vaulted passage, 30 feet long, leading to the CONVENT GARDEN; at its south end is the USHER'S SEAT of stone, with a wicket window behind used by the keeper of the door. I use this word advisedly, to correct a misappropriation of it to the pretty arcaded parlour of the Clugniacs of Wenlock, which served probably as the cloister aumbry next the church door, and also like the three canopied stalls of Norwich as a shaving-place, when the Benedictine went in batches of three under the razor. In foreign monasteries it is designated the ambulatory or alley in front of the Chapter-house. It is a corruption of transcenna, a transit.⁴

THE UNDERCROFT of the refectory has no parallel except at Rievaulx, in the Benedictine cloister of Durham, and, according to tradition, formerly at St. Alban's. It contains three CHAM-

¹ Joubainville, *Études sur l'état intérieur des Abbayes de l'Ordre Cisterc.*, p. 143.

² Walbran's Guide, 74. *Ritual Cisterc. segunda parte*, c. xxii. *Rit. Cist. lib. iv. c. xi. § 7.*

³ *Rit. Cist. lib. v. c. xiii. § 6.*

⁴ *Prompt. Parv. III. 502.* W. of Wyre. *Itin.* p. 288. *Lib. Eliensis*, pp. 262, 274. *Gesta Abb. St. Alban's*, II 362, where one was called Custodia and the other Magna; and *Addit. MS. 29, 522, fo. 27.*

BERS; they may have formed some of those private rooms satirically mentioned by Giraldus, and gravely denounced by John de Athon, where the Cistercians ate meat by stealth, as in a misericord.¹ Originally, no doubt, they formed cellarage, but in the decline of discipline, were converted possibly to this lax use, and also provided comfortable CHEQUERS, or houses of office for the Prior or others in charge of the departments. They are snug little rooms, with a pretty view into the adjoining garden. The eastern apartment is lighted by a window provided with a stone seat and the convenience of a garderobe, which occurs also at Grey, Croxden, Furness, Fountains, and Netley, recessed secretly in the wall. The door opened from the Tresaunt. Each of the two next chambers has a fire-place with transomed windows on either side; the middle room is approachable by two entrances: the northern has a quatrefoiled ceiling above it, where it joins a skew door. The western room has also two doors in its outer wall, one opening directly on the hall stairs, and the other to a cellarage below them, which contains a garderobe.

Between the north door of the undercroft and the stairs, a large segmental arch with rich mouldings, marks the site of the LAVATORY, where the monks washed before going to church or hall, and when a sharp frost was at hand, the hebdomadaries, those in weekly course in the kitchen, furnished hot water and basons. Shaving and haircutting in reciprocating couples² also took place here. The lavatory adjoined the hall entrance at Beaulieu, Bindon, Whalley, Louth, Tintern, Croxden, and Rievaulx.

THE REFECTORY-STAIRS resemble those of Bonport, in France (they are as steep as those up which I have often run to sing Domum at Winchester College, where I can just remember the conduit still in use), and are sixteen in number. The monks ascended them for dinner at noon after sexts (which commenced at half-past eleven) had been said; again for a "biberes" of beer after nones, between half-past two and three; and, in summer time, for a frugal supper immediately before evensong. The beautiful Early English archway has lost its shafts of blue lias: a doorway inside it on a low landing to the west communicates with the ENTRY, from which a door opens into THE CONVENTUAL KITCHEN, 18·6 × 17·10, which was in this position at Citeaux, Kirkstall, Tintern, Beaulieu, Louth Park, Sawley, Netley, and Strata Florida; but at Fountains, Grey, Jorvalle, Rievaulx, and Bindon, upon the east side. Near the S.W. angle are seen the remains of a beautiful NEWEL STAIRCASE for servers to ascend to the abbot's solar in the third story. Close to it is an arched communication with the kitchen. Bonner's view perpetuates a later arrangement at this point, showing a large porch in front of the hall stairs, and a serving room with a five-light window to the north opening towards a small court, inserted between it and the larder door. The mitring of the junction and a few foundations are still visible.

THE SECOND STORY.—THE REFECTORY, 51·6 × 22·4, occupies what has been erroneously called an unprecedented (although it may be an exceptional) position, as at Balmerino, Dunbrody, Boyle, Furness, Buildwas, Whalley and Neath, Senauque, Ourscamp, Pontigny, Sylvacane, and Beauport, standing parallel to the minster,³ and as at Rievaulx, exceptionally raised upon an undercroft. It is Late Perpendicular, with a bell-cot high up in the wall resembling one at Netley,⁴ and large

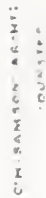
¹ (Spec. Eccl. dist. iii. c. xii, p. 208), "in occulto, firmariis scil. et cameris;" (Lyndw. Prov. Const. Oth. p. 148); "in abscondito" and Cotton MS. Cleop. E. iv. p. 22. The custom grew out of the omission by the abbots to entertain monks on their own better fare at their private table; hence in the 15th century "paucis relictis in Refectorio, in Domo aliâ ad hoc deputatâ carnis vescuntur extra abbatis præsentiam." (Lyndw. u. s. p. 150.)

² Custumal, c. viii. fo. 79 b; c. lxxxv. fo. 55 a. Auditorium juxta coquinam occurs [Us. Ant. P. v. 118].

³ M. de Caumont says of the entire ground-plan: "Il est identique avec celui que l'on observe dans les abbayes du XIIe siècle." (Abec. 88.) The refectories of Fountains and Rievaulx were divided into aisles.

⁴ "Refectorium cum campanile suo."—(MS. Chron. de Crokesden, 83.)

:OLD CLEVEL:



three-light windows; five on the north, and four of richer character, being transomed with a stone beam pierced with quatrefoils, facing the south. On this side are a fireplace, and the arch of the *READER'S PÚLPIT*, used by the monk or novice who read during the time of the repast; it remains also at Fountains, Jorvaulx, Rievaulx, Tintern, and Beaulieu.¹ At Meaux there was a central standard for lights. The fine coved hammer-beam ceiling of oak springs from angel-corbels. Over the dais there is a painting in distemper of the Rood, Saints Mary and John, almost obliterated, within a trefoiled arch, which could be distinctly seen by the two lines of silent monks sitting along the sides of the room.² At the west end there is a panelled entrance doorway under a flattened arch; and to the north of it the smaller *ABBOT'S DOOR*, which opens into the *ABBOT'S BRIDGE*, wainscoted on the south, and lighted towards the garth³ by two square loops, which crosses above the entry and forms the communication with the abbot's lodge. Halfway in its length is a broken arch of stone, and to the south is a door into the painted chamber.

THE SCREENS.—Outside the hall is the landing, or *SCREENS*, with a bench of stone and a mullioned window, partially blocked by the upper part of the garderobe beneath, and having a sill or seat lined with tiles. A fragment of its glass with a floriated pattern in black was found.⁴

PAINTED CHAMBER.—On the west wall a doorway opens into the *PAINTED CHAMBER*, which, no doubt, originally was a buttery: (the whole arrangement resembles that of Winchester College Hall), but in the Perpendicular times was converted into a conclave or withdrawing room. A Perpendicular fireplace has been inserted, and an incurved table of stone for a reader fitted in the window. The walls have been covered with distemper paintings, which are defaced on the west side, but on the east wall represent St. Thecla, attended by guardian angels, standing in the pool of baptism with fish and sea monsters beneath, and at her side the legendary lion to which St. Jerome alludes. On either hand are St. Margaret thrusting her cross staff into the dragon, and St. Katharine holding the wheel and resting on the sword of her martyrdom.

THE ABBOT'S SOLAR, or upper chamber and hall, occupies the story above this chamber, and an adjoining room, which may have contained his bed. His lodge was in the same position at Citeaux and Sawley. Two windows make it cheerful and bright, one near the newel-door fronts the garth; the other, of two lights with quatrefoils in the head, faces the garden and commands a fine view. The ceiling, though less ornate, resembles that of the refectory with which it forms a continuous line.

From the *CONVENTUAL GARDEN* this imposing range of buildings is seen to the greatest advantage in the magnificent proportions of the refectory with its five windows and stately chimney clad in masses of ivy; south-westward of it are the windows of the Screens, the painted chamber, and abbot's lodge, above the picturesque windows of the undercroft; and to the east the lancets of the dormitory, and the southern front of the day room. The artist and architect will at once recognise its rare beauty.

THE WEST ALLEY.—In place of the penticed walk, buildings have been erected, divided by a porch. The northern room, 33·11 × 13·6, was probably the *LARDER*; two arches, one of which is

¹ Besides those used according to the Table of Proper Lessons, the books read were the Proverbs, Ecclesiastes, the Song of Songs, Wisdom, Ecclesiasticus, Job, Tobit, Judith, Esther, and Esdras. (Ordin. Cisterc. cap. cxvi.; Rock, Ch. of our Fathers, iv. 94; Ritual Cisterc. Primera Parte, c. l. § v. vi.) ² Rit. Cisterc. lib. iv. c. v. § 4.

³ Compare the tubular bridge between the vestibule of the Treasury and the Prior's Chapel at Canterbury. (Prof. Willis, in Arch. Cantiana, vii. 79, 80.)

⁴ A small fragment of glass was found here like one now at Birlingham, which Mr. Ponsford, steward of the manor, tells me has this "scripture," "W. D. abbas de Cleeve," in dull yellow on a scroll, which was taken away some years since.

now a window, opened towards the garth. Above it are lodgings, with a single loop to the east, and a large five-light window to the west, extending over the porch. It has a panelled partition of wainscot and a fireplace, the mantle of which is formed out of a sepulchral slab, ensigned with a cross. It may have been occupied by the abbot's chaplain or his household servants. A door on the south side opened into the range of buildings, over a substructure, now destroyed. Bonner's view represents the entire upper story with six buttresses, and two windows of two lights transomed with abatements in the head, northward of the porch, and southward two pairs of square-headed loops. The substructure on this side, 33·10 × 13·6, now forms an alley wrought in stone, a rare feature in a Cistercian cloister, but there were parallels at Ford and Salley, and in front of the chapter-house at Croxden, all of a late period.

Four windows of four-lights, three retaining their tracery, may have served as a glazed arcade in front of carols¹ or enclosed studies, as in similar instances at Melrose, and at Worcester, and Gloucester, both Benedictine houses.

THE GATEWAY PORCH, 19·1 × 12·6, opens into the cloister by a richly-moulded arch, and on the south there is a door with fine floriated spandrils pierced through a partition of panelled timber and plaster-work. This central entrance is found at Neath, Beaulieu, and Fountains, and there are corresponding approaches at Netley, Boyle, Tintern, Buildwas, Jorvaulx, Merevale, and Furness. Kirkstall and Bindon had a slype at the N.W. angle, which like this porch, served as a forensic, or OUTER PARLOUR (the reception-room), where at the cloister door, according to the rule,² two monks, or one monk (attended if in a large house by a convert) served by turns, waiting at the cloister door to preclude the access of secular persons. Here, by permission of the superior, monks conversed with visitors and friends.

At the end of this alley is the PROCESSIONAL DOOR, opening into the west part of the south nave aisle. A straining arch on this side, and another to the north alley, give some resemblance to the ingenious arrangement for carrying the west end of St. Faith's chapel over the cloister of Chichester. Here probably the floor of the upper lodgings was carried upon stout ashlar ribs.

THE NORTH ALLEY [*Clastrum Collacionis*] retains the trefoil-headed arch of the prælector's or claustral prior's chair,³ occupied during the time of reading and study, and especially of collation, set opposite the lectern of the reader. The Maundy, or feet-washing, on Thursday in Holy Week, and the weekly washing of their feet by the monks on Saturday evening, took place here.⁴ There is another example at Grey Abbey, and the *Custumal* mentions a presiding monk "*qui sedem abbatis tenet.*"⁵ At Beaulieu the north wall of the nave contains a series of recessed seats for students:

¹ Comp. Durham (*Rites*, pp. 70, 71), and S. Mary Overye (*Gent. Mag.* xiii. N. S. p. 756). For Melrose, see my *Scoto-Monasticon*, 282, and Morton's *Mon. Annals*, 224. They were not to be occupied in cloister time [*Stat.* 1277].

The General Chapter in 1134 speaks of them as *Scriptoria*, requiring that silence should be observed in them as in the cloister (*Nomast. Cist.* p. 272); and Martene mentions in *le cloître du colloque* at Clairvaux "*douze ou quinze petites cellules, tout d'un rang où les religieux écrivaient autrefois des livres, c'est pourquoi on les appelle encore aujourd'hui des écritoirs.*" (*Voy. Litt.* P. 1, p. 102.) They wrote under the care of the chanter, who was both librarian and keeper of the archives. No illuminations or miniatures were permitted; MSS. were kept in commune armarium, and borrowed from it for the use of the infirm. Although study was not a primary object with this order, it built colleges of S. Bernard at Oxford, 1281, Salamanca, Bologna, Montpellier, Paris, Toulouse, and Metz.

² *Rituale*, lib. vii. c. xi. § 2; MS. Harl. 3708, dist. ix. c. iii. f. 37 b; Addit. 11, 298, dist. viii. c. viii. fo. 84 b.

³ The Inventory of Clairvaux (1472) distinguishes "*l'armaire du cloître emprés la libraire du cloître*" already mentioned from "*l'armaire du collation [the books used at collations] d'emprés le siège du président.*" (*Joubainville*, 447, 448, 436 and 433.)

⁴ *Rit. Cist.* lib. iv. c. x. § 1; l. iii. c. xx. § 19.

⁵ "*Egressi de capitulo,*" the English *Custumal* proceeds, after matin mass, "*sedeant ad Lectionem qui in clauastro sederint; religiosè se habeant singuli in singulis libris legentes.*" They read again after vespers. At collation,

"The monks' seats" in cloister are also mentioned in the inventory of Dieulacres.¹ In the French houses, as at Clairvaux, they often had accommodation in a special cloister. The three lancets in the nave aisle once could be seen above the pentice-roof of the alley. It was carried, no doubt, upon a timbered front, composed of stout standard poles.

There were two wooden cloisters at Clairvaux.² At the east side are the remains of a PROCESSIONAL DOOR, through which the convent began the daily circuit of the cloister to represent the pilgrimage of Man.

III.—BUILDINGS OF HOSPITALITY—THE GUEST-HOUSE AND WESTERN RANGE.

There were several guest-houses: one for gentle-born, another for poor, with usually, if not always, an infirmary for the sick, under the care of a permanent physician; a third for Cistercian travellers, and a fourth for religious of various orders.

Outside the west alley are foundations of an original range of buildings, of equal width with the undercroft of the dormitory and refectory. It has the base of a newel-staircase at the S.W. angle of the nave, which may have communicated with the infirmary, or very possibly with a converts' dormitory, forming a portion of the entire range. At Boyle tradition places the infirmary on the north, and the guest-house southward of the porter's lodge. At Valle Crucis, and at Boyle,³ stairs are formed within the west wall of the south aisle. At Whalley and Vaux de Sernay there are also lodgings over an undercroft external to the cloister-garth, and a staircase at the south-west angle leads up to them. Similar buildings existed at Jorevalle and Kirkstall; those at Beaulieu and Fountains have been already noticed. At Beaulieu the porch seems to have sundered between the guest-house lying southward and the cellarage, either with the infirmary or a converts' dormitory as (at Ourscamp), above it, communicating with the church by stairs. A portion of the western range survives at Croxden, and traces have been found at Buildwas, Louth Park, and Furness. At Pontigny, in the twelfth century, the corresponding range extended beyond the line of the west front.⁴ At Abbey Dore a narrow court intervened between the outer building and the west alley, just as one also did at Buildwas, thus providing at once for their exclusion from the cloister, and making a private approach for the guests to the church. At Netley and Tintern there was an outer penticed wall which opened into a side entrance of the nave-aisle. In these instances the guest-house and converts' dormitory were in one range.

The Cistercians were in fact a French order, as the Benedictines were Italian, and the Austin Canons-Regular Lorrainers, and Gilbertines English by descent. If we turn to the *Monasticon Gallicanum*, with its unrivalled series of plans of Benedictine houses (and the Cistercians were only a reformed congregation of that great order living under its rule), we find in every case in this position, according to ancient precedent, cellarage over which were the chambers in which the guests ate and slept.⁵ Thus, hostry, hospice, guest-hall, or guest-house, as it was indifferently called,

or reading before compline: the monks assembled here; "*infra Priorem versùs Claustrum inferiùs sint sacerdotes chori ipsius; et juniores ex adverso; in alterà parte versùs Ecclesiam sacerdotes chori abbatis, et ex adverso juniores monachi et omnes novicii. Qui præest collationi sedet in medio seniorum ante analogium.*" (Rit. Cist. lib. iii. c. xi. § 1.)

¹ Cap. lxx., lxxix.; Addit. MS. 18, 148, fo. 46.

² Joubainville, p. 356.

³ Buckler's Cist. Arch.; Addit. MS. 29, 720, fo. 50; and a plan lent to me by the Misses Robertson.

⁴ Viollet le Duc, Dict. i. 272.

Custumal, c. xviii.

was placed near the outer parlour; and the cellarer, with a "monachus hospitalis" attended to their needs in a Cistercian monastery.¹ I find it at St. George's and St. Owen's at Rouen; St. Pierre sur Dives; Fecamp; St. Wandrille; St. Maur; St. Florence, Saumur; St. Peter, Sens; St. Denys, Bonvalle, Beaumont, Bernay; St. Carileph, Lonlay, Angers, and Seez.² In two cases at Laon and St. Maur, the infirmary was above it; in one, at Rheims, the menials' rooms were underneath. At St. Gall the cellarage, with a guest-house behind it, adjoined this side. In England, as at St. Alban's, the great abbots had often their own visitors lodged on this side; at Norwich the guest-house door, at Sherborne the guest-hall, is still pointed out; at Chester the great hall and green hall stood above the cellarage, and at Canterbury they adjoined.

In the year 1827 a pretty and popular, but anonymous, history of Kirkstall designated such a range as the "Lay-brothers' Dormitory." I have found only two allusions to their lodgings, one at Kirkstall, "*ecclesia et utrumque dormitorium, monachorum scil. et conversorum, utrumque etiam refectarium.*"³ This is at the foundation, the other lies between 1210 and 1220 at Meaux. "*Refectarium conversorum et domus superior, scil. dormitorium corundem.*"⁴ Both notices date before the multiplication of granges required their presence elsewhere. The servants certainly dined in the hall.⁵ They corresponded to the sisters in a nunnery. "The Labourers' Chamber" occurs at Hayles in connexion with the domestic offices and the porter's chambers with other servants' beds at Merevale.

The *Monasticon Gallicanum* shows the Benedictine converts' hall as a modest room annexed to the refectory. M. Viollet-le-Duc recognises the western substructures as granaries at Citeaux, Vaux de Sernay, and Pontigny (still existing) [and Lubke says the same for German airangement⁶]; while he tells us "*les Frères Convers ne se trouvaient pas ainsi dans l'enceinte réservée aux religieux profès.*"⁷ That most learned archæologist, M. de Caumont (with whom I had the advantage of

¹ Cotton MS. Claud. B. vi. ff. 205, 206 b. I regret to say that my accomplished friend, M. Bouet of Caen, writes thus to me: "*Le Bulletin Monumentale contient des articles sur Sylvacane, Senauque et Thorouet et dessins de l'abbaye de Fontenay. Les batimens conventuels d'Aunay sont modernes. Le plan de Clairvaux a les changements qui y avait été faits au XVII ou XVIII siècle. Il n'y a pas pour les Cisterciens d'ouvrages comme le monasticon pour les Benedictins.*" The exceptional plan of Citeaux in that collection is not earlier than the 16th century.

² "*Dans beaucoup d'abbayes la partie occidentale des batiments claustraux renfermait, soit de magasins, soit l'hospitium (cellæ hospitum) pièces destinées aux hôtes.*" When the cellarage was in two stories, the lower contained wine and cider, and the upper rooms were stored with corn and the produce of the granges. (De Caumont, *Abec.* pp. 42, 43.)

³ *Monasticon*, 856.

⁴ *Chron. de Melsa*, i. 326. A later notice refers to the time immediately before their abolition, when they numbered no more than seven. 1372-97. "*Partem claustrum ab ostio refectorii Monachorum usque ad Dormitorium Conversorum plumbo fecit cooperiri.*" 1396-9. "*In claustro nostro ipsam partem claustrum à Dormitorio Monachorum, usque ad Dormitorium Conversorum juxta Ecclesiam fecit reparari. In occidentali parte claustrum, et in orientali parte infirmitarii monachorum ostia magna procuravit.*"—*Chron. de Melsa*, iii. 241. The Ritual mentions their own refectory and dormitory, and also that they exceptionally dined in the monks' refectory. (*Lib. iv. cap. xiv. § 13, 19.*) "*Los Conversos tienen tambien la misma comida, los mismos ayunos, las mismas vigiliass, y la misma cama que los demas monges pero en refectorio y dormitorio separado.*" [*Compendio de los Exercicios de los Monges Cistercienses*, art. vii. 67.] With a separate chapter-house (*Ib. c. xv. § 7.*), these formed a separate group at Clairvaux, southward of the refectory and the western range of cellarage. The Guest-house adjoined the Poleyn-gate at Meaux (the actual entrance of the cloister) and the cellarage-door, whilst a pentice led from it down to the Great Gate. I observe that a new name has been introduced—the *Domus Conversorum*: it existed only in London, in 1233, for converted Jews, and is now the Rolls Court. (*Spelman, Gloss. p. 183.*) The converts attended mass in the minster.

⁵ With the reader. (*Rit. Cist. lib. iv. c. viii.*) This we learn also from Gerald du Barri, "*per claustrum transiens [Abbas de Bello] ante Refectarium illud intravit, abbatem tamen altero [Cisterciensem] dissuadente propter servientes, ut ait, qui tunc comedebant.*" (*Spec. Eccles. dist. iii. c. xiii. p. 216.*)

⁶ *Eccles. Art in Germany*, 107.

⁷ *Dict.* 270, 273, 274.

enjoying a long conference on monastic arrangements at Caen some years since), distinctly states that here stood the guest-house over the cellarage, and relegates "le refectoire pour les gens de service" to the base court,¹ and their "logemens" to the great or abbey-court in company with offices, barns, and workshops.²

CONVERTS OR LAY-BROTHERS.³

Received there for distinct work, by the bishop's license, as necessary coadjutors of the monks, and assisted by hired servants, though under the charge of the brethren, they were at first regarded as brethren and partners. The choir-brother imparted his spiritual goods, the lay-brother requited by giving him time for the service of God.⁴ Every Cistercian abbey had two monasteries, one of lay-brothers and the other of clerks. A special chapter of rules was drawn up "qualiter se habeant Fratres laici in Grangiis."⁵ They had on the manors a church, a refectory, dorter, chapter-house, and calefactory, and took the management of the outlying domains. Their daily toil excused them from keeping the earlier part of the night hours.

All the wool of the Cistercian houses for one year, in lieu of money, was given to King Richard's ransom.⁶ No domestic servants were permitted, unless the number of converts was less than ten. At Clairvaux they were in excess of the monks.⁷ At Waverley, the annals mention that in 1188 there were 70 monks and 120 converts. Beaulieu sent 20 monks and 10 converts to colonise Hayles, and 10 monks and 4 lay-brothers to Newenham. Kirkstall at its foundation had 12 monks and 10 converts.⁸ Meaux, in the fourteenth century, contained 42 monks and 7 converts "in conventu;" but the converts were dismissed or resigned, and the household was reduced to "mercenarii servientes." Even the great Benedictine abbey of Evesham contained only 67 monks and 65 servants. The number of conversi has been over-estimated, and a misapprehension of their true condition, and the dispersion of the majority over the estate,⁹ has led to the very improbable theory that honoured guests were displaced from their neighbourhood by respectful hosts to give room to servants and subordinates. Hospitality and charity were primary duties, and new buildings were only erected out of the surplus of an expenditure necessarily large. "Privatus illis census erat brevis: commune magnum."

A Guest House was an essential portion of a monastery; lay-brothers were its accident. The word originally denoted an adult in distinction to the oblate, which included both the youthful candidate for the novitiate and servants (*familiares*), who, except in the interval from the thirteenth

¹ "Artificum officinæ et cubicula."—Monast. Gallic. Planche 130.

² Abecedaire, pp. 42, 52, 95. "Le monument de Vaucclair bordait le cloître. Je suppose que c'était la que les hôtes étaient reçus au XIII^e siècle."

³ Joubainville, ch. iii. § 1, and pp. 25, 43; Monasticon, 146, 924; Chron. de Evesh. 285; Chron. de Abingdon, 343; the English Cisterc. Ordinat. in Rock. Ch. of our Fath. vol. iv. app.; Lyndw. Prov. l. iii. t. 9, p. 158; Ang. Sac. i. 343, 344; Mabillon, Præf. Act. Sanc. iii. i. § 20; Bullet. Monum. xvii. 130; Lenoir, ii. 427-8; Martene, Voy. Litter. i. 99, and Thes. iv. 1647-9; Stat. of Buckfastre, Sloane MS. 513, fo. 201 b; MS. Addit. 11, 298, dist. xiv. and dist. viii. c. vii. fo. 84 b; Harl. 3708, dist. xiv. ff. 47-51.

⁴ Dial. inter Clugn. et Cist. Martene, Thes. v. 1645; Add. MS. 18, 148, fo. 60 b. L'Abbé Moyne, in his memoir on Senauque, says: "Il dois y en avoir une grange plus rapprochée et mesme dans l'enceinte du monastère appelée quelquefois le Couvent des Frères lais." At Ourscamp their dormitory is marked on a building parallel with the western alley of the cloister, towards the south.

⁵ Ib. fo. 87, 88.

⁶ Hoveden, iii. 210; Matt. Par. ii. 58.

⁷ Op. S. Bern. i. 1345.

⁸ Monasticon, 928, 855.

⁹ Chron. iii. 36, 229; Tib. c. vi. fo. 233.

century to 1453 were allowed to be married.¹ In the sense of a middle class of helpers they were first admitted at Vallombrosa in 1063.² The monks were the head, and the lay-brothers the arms, of the community. Convert he remained to the end of his days, unless he was degraded to be a servant. If good enough to be received as a monk, he could not be accepted as a convert; he was in theory to earn the wages of an ordinary labourer; he was never addressed as brother, neither could he change his special habit for the cowl; on the other hand, the dress and vow distinguished him from "*servientes sæculares*" and lay folk. He worshipped in his own choir, lived and slept among his fellows, took his meals apart from the convent, under the superintendence of a monk or the senior of his class.³

The vestiarer, who corresponded to the Benedictine chamberlain, had charge of the tailors and weavers. The convert's whole literature was confined to the repetition of his Latin prayers by rote; he simply replaced the unlettered monk, who could not learn the choir services, and therefore was employed in menial service. The introduction of vicarious labour by "*commissi*" was in direct subversion of the rule of St. Bernard, and was a device to restrain the monks to their devotions, and prevent them from leaving their cloister and breaking silence, as lands were added to lands, and required new colonies; and then, like the grand seigneurs of Italy and Spain, the tonsured brothers took the name of Dom, to distinguish themselves from their bearded menials.⁴ Some were retained as servants and acolyths in church, assistants or reliefs (*solatia*) to obedientiaries, and unlettered labourers and workmen,⁵ deputies in manual toil at home; but their true occupation, as in nunneries, "*ad officii ruralia exercenda*," was on the scattered granges or lonely farms, though still under the general superintendence of the cellarer.

My impression is that Abbot Dovell, for reasons known to himself, removed the guests to his remodelled chambers over the abbey gate, and erected a new cloister and lodging, retaining only the east wall for the former range.

MENIAL OR DOMESTIC BUILDINGS.

The whole western side of the close to the south, and beyond the swift mill-stream that flows towards the gate-house, was occupied by the buildings of the

COMMON GREAT OR ABBEY-COURT,

with bartons, stables, garners, brew-house, bake-house, the smith's forge, furriers, weavers, cord-wainers,⁶ carpenters, masons, and tailors' rooms; and those of waggoners, ploughmen, shepherds, and hinds. Over them were the lodgings of the lay-brothers who, being retained in the precinct, worked at trades, and those of the hired servants. At Fountains the poor men's hostel (*xenodochium pauperum*) stood here. This court retains its western wall pierced with a doorway, having a hood

¹ Joubainville, ch. i. p. 25.

² Fleury, H. E. ix. ; lxi. § 4; lxiii. § 68.

³ Martene, iv. 1259, 1263, 1365, 1359; Hospinian, lib. iii. p. 308; c. lxxviii. Add. MS. 18, 148, fo. 146; comp. Ordin. Cist. c. lxxv.; Rock. Ch. of our Fath. iv. 91.

⁴ Fleury, H. E. xi. dist. viii. § v. p. xxiii.

⁵ Op. S. Bernardi, i. 321; Rit. Cist. lib. iv. c. xiv. § 15, 16.

⁶ Monasticon, 856; Chron. de Melsa and the Custumal; MS. Addit. 11, 298, dist. viii. c. vii. fo. 84 b.

over it, and also a portion of the south wall, with an arch which opened into the convent garden. The walls of the **PRECINCT** may be traced northward of the gate-house, turning with a cross closure ending in a buttress, which has pretty trefoiled terminals, like some at Whitby, and abutting upon the site of the **STEWPONDS**. These may be clearly identified, as at Croxden, Netley, Buildwas, Kirkstall, and Furness. In this meadow nearer the Minster, there is a wall forty-one feet long, with remains of a groined porch and traces of a large building, as at Beaulieu; it may have contained the wine or cyder-press. The **MOATS**, which formed the protection of the **HOME PARK** on the east and north, have been recently filled up.

The octagonal base of a **MARKET CROSS**,¹ in which a spreading sycamore has supplanted the shaft is visible outside the gateway-porch. Here was kept the weekly market on Wednesdays, and the annual fairs on the vigil, feast, and morrow of St. James the Apostle, and the exaltation of Holy Cross, which the King granted to reimburse the convent for the large cost which it had incurred in rebuilding St. Mary's Chapel-by-the-Sea. Round the country-side there was no chapman or farmer who better understood how to sell wool and grain or to breed strong horses² than a Cistercian monk. The **ABBAY MILL** stands up the valley, not far from the Early-English **GRANGE OF S. PANCRAS**, now converted into a cottage; but retaining a lancet-window. The pitched path which led to the once prebendal church of Old Cleeve and the hospital chapel of St. Mary, over the hill, passing the base of a wayside cross, still exists at intervals. Part of it now connects the remains the **BARBICAN** or **WATER-GATE**, consisting of the jambs of the date of Richard II., with

THE ABBEY GREAT GATE-HOUSE,³

which, in its lower story, belongs to the same period, and measures 46 × 13·6. It rivals those of Whalley, Byland, and Beaulieu: at Furness, Kirkstall, Buildwas, Dunkerswell, and Fountains, fragments only remain. On the north side, the voussoirs of the arch are alternately red and white. The gable contains an image of St. Mary with her Holy Child above a niche which once held the figure of a kneeling abbot. Upon the south side the gable has, in a canopied niche, the Holy Rood, but its attendant figures of the Blessed Virgin Mother, and John, the beloved disciple, have been destroyed, or fallen from their hovels or tabernacles. This upper story was recast early in the 16th century, and supplied with four-light windows to form a **GUEST-HOUSE**, as at Whalley.⁴ The open timber roof, a fireplace, and the doors which opened into the lateral dormitory on the west side remain. The lower portion was plainly vaulted. The ordinary divisions of a gate-house, to the south a gate-hall, where guests waited for admission to the abbey court, and to the north an open portal or porch are well defined by a recess in the east wall, midway into which the postern-like half-gate was folded back. The side walls have two large segmental arches. On the south-west is the

¹ M. Bouet says: "Une croix était placée auprès de la porte d'Ourscamp, il en était de même autrefois à Senauque, et probablement dans les autres abbayes Cisterciennes." M. Leon de Duranville mentions one at Bonport, "comme nous l'avons vu dans plusieurs autres abbayes Cisterciennes." When there was no conventual market, the farm produce was sold weekly in the nearest town, and Girald mentions monks going round the countryside as travellers with their flax and wheat.

² Girald. Spec. dist. iii. pp. 20, 137, and ch. xvj. Hospinian, p. 315.

³ "Omnes porte abbatiarum sint extra terminos."—MS. Harl. 3708, fo. 19.

⁴ The Austin Canons had one at Thornton. At Meaux a "hanging chapel" was over it, as in some Benedictine houses (for instance Peterborough), but the design was laid aside.

doorway to the PORTER'S LODGE, which remains unroofed; and nearly opposite is his rudely-formed watch-box, within an arch: whilst on the north-east a doorway opened into the ALMONRY with a square TURN or hutch for the daily dole of broken food and raiment, as I noticed in the *Trans. R. I. B.A.* vi. 67. The aperture may also have served to hold the porter's lamp at evening. It was also a dispensary, for the Cistercians were active mediciners, as we learn from Girald du Barri. Hither the porter came before Lauds, and when a guest knocked he answered, "Deo Gratias," as if rejoiced to show hospitality, and opened the gate. Again he said "Benedicite," and closed it; meekly he asked the comer who he was, or what his will, and when he found that he desired admission, led him in, and went to announce him to the proper officer.² There are two tablets on the Gate-house front, one containing the name of Dovell,³ which the record-clerk, in noting down his pension in the fatal year of dissolution, 1536,⁴ happily wrote, Dówell, and on the other the abbot's welcome:—

"Porta, patens esto:
Nulli claudaris honesto."

There is a Flemish proverb, "Faute d'une point Martin perdit son âne," which relates to a former abbot of Alne, who set up the same inscription, but ignorantly placed a stop after "nulli:" the neighbourhood was scandalized, and the local seigneur stopped all further misapprehension by pulling down Martin's abbey about his ears. Gerald du Barri has some amusing stories of the Cistercians' ignorance of scholarship; and Hospinian⁵ tells how an abbot, hearing the usual Benedictine grace before meat, "Benedictus benedicat!" conceiving it to be a slight on the saint of his Order, vindicated his zeal at the expense of Latinity by saying, on his return in his own hall, "Bernardus Bernardat!"

¹ L'Abbe Moyne says of Senauque, "Si le voyageur attardé n'atteignait que pendant la nuit les coteaux dominant le monastère, une lanterne placé à l'entrée du couvent selon les prescriptions de la règle lui indiquait le point où il devoit descendre, ou l'on serait heureux de l'accueillir. Le logement du portier devoit s'avancer jusqu'au premier contrefort de la façade. Alors la niche que l'on y voit aurait été destinée à recevoir la lampe allumée toute la nuit pour la service de la porte, tandis que dans l'autre contrefort veillait la lanterne qui servait de phare au voyageur. Ces niches sont encore charbonnées par la fumée. Les hotes étaient conduits dans l'église pour y saluer le premier maître de la maison."

² Statutes, Addit. MS. 18, 148, fo. 77. M. Bouet, mentioning his visit to La Trappe, says, "Le premier cour de l'abbaye contient à droite l'hotellerie et à gauche hospice où recoit gratuitement tous les voyageurs pendant 3 jours. Y étant arrivé après le soleil couché je n'ai pu être reçu à l'hotellerie, de plus l'auberge était pleine, il m'a fallu alors souper et coucher à l'hospice avec pauvres. Le matin l'abbé me fit inviter à loger à l'hotellerie." The *Xenodochium Pauperum* at Fountains was "in introitu areæ versus austrum."

³ Augm. Off. Books, 232, p. 29.

⁴ ABBOTS OF CLEEVE:

Ralph.
? [Waleran?]
? [Alan of Bordesley?]
Hugh.
William.
1248 John Godard, of Kent, late Abbot of
Newenham.
Henry, c. 1297.
1315 Richard le Bret.
1321 Robert de Clive.
1338 Henry.
1367 James.

1407 John Mason.
John Plympton.
1416 Leonard.
1419 William Seylake.
1421 John Stone.
1435 David Joyner.
1487 Humphrey.
14— W. Donestere.
1500 Henry.
John Peynter.
1510 William Dovell.

⁵ De Monachis, lib. iv. c. ix. p. 314. The Order was called Bernardine, and adopted the arms of the saint. "Porte pour armes de la Comté de Bourgogne, à cause de son premier fondateur, parti d'azur à un bras broqué d'argent tenant une crosse d'or; frisant sur le tout les armoires de St. Bernard qui sont en bande eschiquettée d'argent et de gueules de 3 traits" (Extrait d'un manuscrit de Quentin de Goussancourt Fonds Français, 23, 981, communicated by M. Bouet.) The arms of Cleeve were Gu. lozengy, or, a modification of those of Romara, the founder.

In conclusion, I will suggest the inquiry whether we may ascribe the adoption of a plan which at once strikes the eye as most unusual, to the Benedictine monk, Milo of Tewksbury,¹ who was living here as a member of the abbey in 1232. I merely record the fact, as I have had to notice peculiarities which will interest the most experienced architect—the aisleless chapter-house, the refectory lying east and west, and built over an undercroft, the unusual position of the daystairs, and the presence of a stone cloister. The younger student may study in the school of a pure English style without exotic or meretricious ornament, and all of us may learn a lesson in our several callings from the motto of the busy and reverent builders, “Laborare est orare”—Labour is Prayer.

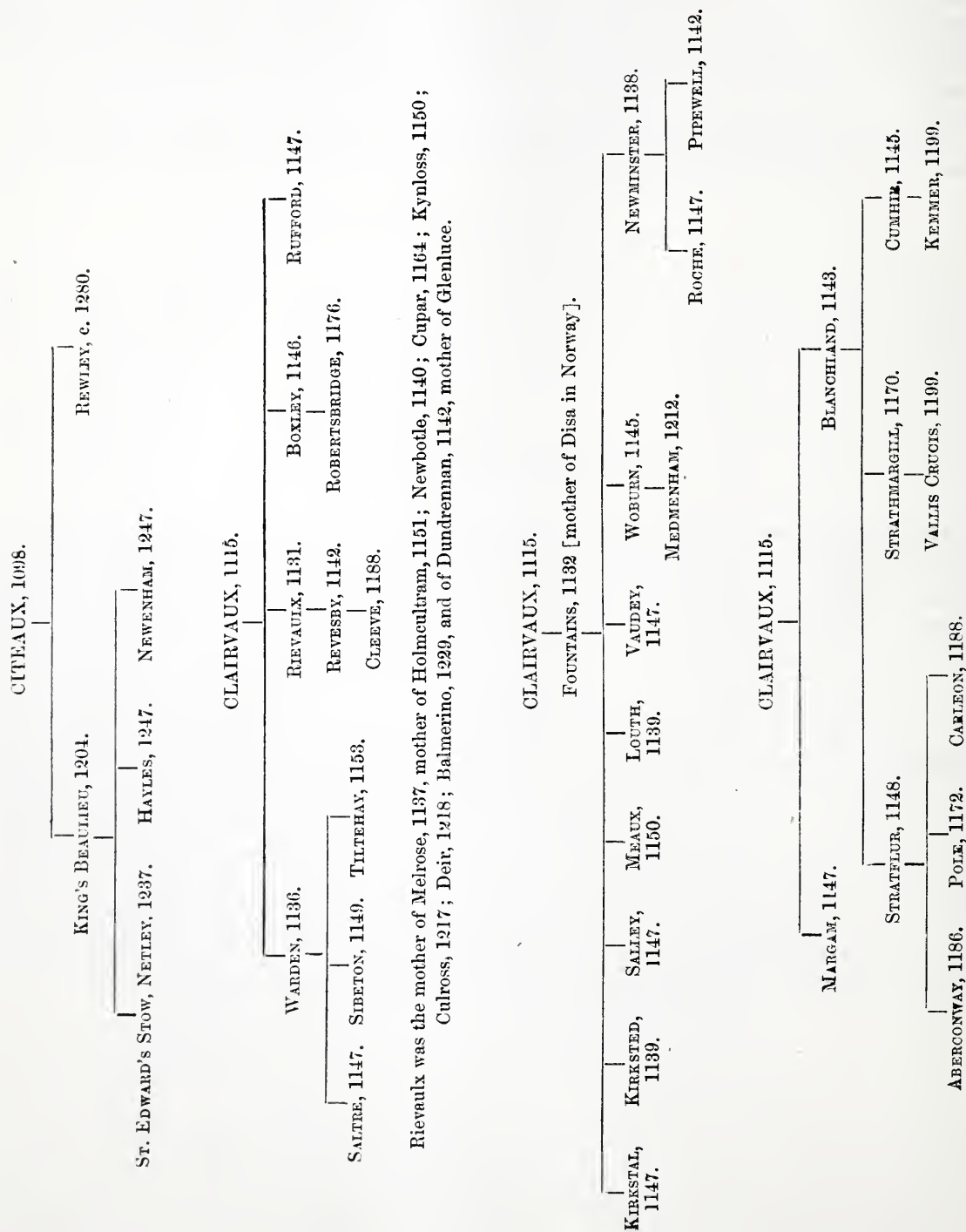
¹ “Milo et Joh. redierunt ad ordinem pristinum qui illicenciati ad ordinem Cic. convolaverunt, unus apud Neht et alius apud Cleve.”—Chron. de Theokesb. Ann. Mon. i. 86.

SUPPLEMENTARY NOTE.

P. S. As these sheets were about to be printed, I received a most interesting letter from the Right Rev. Bartholomew, lord abbot of Mount St. Bernard's (county Leicester), accompanied by a plan “designed by Pugin on the original Cistercian ground-plan.” The refectory holds the exact position occupied by that of Cleeve; a passage near the chapter-house leads to the calefactory; the north alley is called the “Reading cloister.” The abbot, prior, and all the community sleep in separate compartments in the dormitory. The abbot does not dine with the guests, but in hall, “according to the primitive usages of the eleventh century,” and has only a private room to receive those who have business with him. The building abutting on the west alley of the cloister contains cells of officers, prior, and other superiors, overlooking the garth. The guest-house and almonry are detached across a court still more to the west. The library and infirmary lie westward of the refectory in one range. The “reading-room,” lavatory, and “speaking-cell,” flank the sides of the vestibule of the chapter-house. At Cleeve he suggests that “some of the rooms, the use of which is not defined, no doubt have been parlours, wherein to hang the cowls, &c., at certain hours *on working days*. The skew-door, I think, was simply a private entrance to the church, probably for the use of him whose duty it was to wake the monks. We have no special term for that official.”

THE CISTERCIAN PEDIGREE IN ENGLAND.

I subjoin a Pedigree of Cistercian Abbeys, which will be found useful for a comparison of affiliated Convents and the parent foundations.



SAVIGNY, 1118.

COGGESHALL, 1137.	BUCKFASTRE, 1136.	QUARR, 1129.	BUILDWAS, 1135.	NEATH, 1130.	FURNESS,* 1127.	BYLAND, 1138.	COMBERMERE, 1136.	STRATFORD, 1140.
	STANLEY, BUCKLAND, 1140. 1278.		BASINGWERK, DUNERODY, 1141. 1178.	CALDER, SWINESHEAD, 1134. 1148.		JOREVALLE, 1150.	DEULACRES, STANLAW, HILTON, 1138. 1172, afterwards WHALLEY.	
				[See also Monasticon, 710.]				

* Premier Abbey in England; mother of Rushin, 1238; Fermoy, or God's Castle, 1170; Ynes, 1180; Holy Cross, 1180; Corcumroe, Fruitful Rock, 1197; Wethney, 1180; and Inislaunaght, 1240.

L'AUMONE, 1131.

WAVERLEY, 1129, the chief abbey in all congregations obedient to L'Aumone and Savigny.					TINTERN, 1131.
GERONDON, 1133.	THAME, 1138.	FORD, 1136.	COMBE, 1151.	KINGSWOOD, 1138.	TINTERN IN IRELAND.
	BYNDON, 1172.		DUNKESWELL, 1201.		
BRUERE, 1147.	BORDESLEY, 1138.				
FLEXLEY, 1154.	MEREVALE, 1148.	STONELEY, 1154.			

MR. BENJAMIN FERREY, Fellow.—It was my good fortune, last summer, to be travelling in Somersetshire, when I accidentally fell in with our admirable lecturer in the very course of his examination of this building. I had the pleasure of accompanying him over every part of it, and I can testify to the accuracy of all he has stated with regard to that building. Singularly enough, after we had looked over it, he showed me a conjectural plan which he had drawn out previous to his examination, and on comparing the building with his plan, the walls corresponded in every instance with it as to position, within about a foot or two. Mr. Walcott pointed out every portion of the building, and I think his conclusions are very fair. There was one difficulty at the western end. We found the western wall thick and clearly defined; but the inner wall puzzled us. It was about three or four feet within the western wall itself, and appeared to communicate with an angular staircase, to which Mr. Walcott has alluded; but the use of that passage I have yet to hear explained. I cannot speak as to the uses of various parts of the building, but I believe he is correct with regard to all the portions he has described. It would be interesting to hear from gentlemen present a good deal more on this subject. I have the pleasure of seeing the Rev. Mr. Baker, to whom we are indebted for a description of Beaulieu Abbey; we have also Mr. Sharpe with us. An immense number of tiles were found. I never saw a more beautiful collection. There are drawings of them here; but they give no adequate idea of the beauty of the tiles themselves. There is much in them which will interest the archæologist and the artist; and it will repay the tourist to go from Taunton to Watchet to examine this Abbey, which is replete with interest throughout.

THE REV. F. W. BAKER, M.A. (of Brighton).—All I could say would be to explain what I have found at Beaulieu, and I can best do so by going near the plan which my friend has placed on the wall. I was very much in the same position as Mr. Walcott when I was appointed to the living of Beaulieu, some twenty-five years ago. The site of the Abbey Church was entirely unknown [Mr. Baker pointed out the positions of the buildings on the plan]. The buildings which are marked black were in existence, together with a portion of the Chapter-House. His Grace the Duke of Buccleuch, the owner of the estate, expressed a wish that excavations should be made for the purpose of discovering the position of the church and other buildings. There was a small building, by tradition called the church, but it was merely a *barn*, or possibly a wine-press. His Grace having kindly allowed me a band of workmen, we at last came upon the foundations of the church, which we were able to trace very distinctly as far as the steward's garden, where a deep trench had been dug, which cut off the apse, as I believe it was, because the wall and buttress curve similarly, and at that spot we found a stone, not exactly a corbel, but a circular weathering-stone, which corresponded to that curve; and a short distance off, where the ground was higher, we found two courses of cut stone *in situ*. The Abbey was founded in 1204, and it has been much doubted whether a circular apse would have been built at so late a period; but as the monks were brought direct from Cîteaux, by King John, the founder, nothing is more probable than that they seek to reproduce the circular apse of the Church of Clairvaux with which they were so familiar. [Having pointed out on the plan the positions of various parts which exactly correspond with Mr. Sharpe's normal plan of the building of the Cistercians, and with Mr. Walcott's discoveries at Cleeve, with the exception of the Refectory, which, at Cleeve, stands east and west, Mr. Baker went on to say],—I can confirm what Mr. Walcott expresses as his opinion with regard to the particular staircase found at Cleeve. In the case of Beaulieu, I think there is no doubt it led to the dormitory; but whether that of the monks or the guests I cannot say, and this staircase is evidently older than some of the contiguous work. We also come upon the porch, which no doubt, formed the entrance to the cloister, and corresponds to the porter's lodge of what Mr. Sharpe styles the 'Domus Conversorum.' The Refectory, at Beaulieu, after the Reformation, was converted into the parish church, and contains the well-known stone pulpit with its arcaded

staircase. The building is in perfect repair, having been restored under Mr. Ferrey some years since, and more recently under Mr. Blomfield. The *foundations of the Refectory* at Netley Abbey were, a few years since, traced by the late Mr. Kell and myself, in the same position, standing north and south. Refectories being, in all cases I have met with, at right angles to the cloister, the case of Cleeve shows that it was not universal. There have been some interesting discoveries made here by Lord Henry Scott, who has built a residence adjoining the old *Gate House*, which he has most carefully restored, and he discovered some curious staircases and arches. I may add, that tiles of the description shown in the drawings here were found at Beaulieu, and there is a considerable portion of the pavement of the church *in situ* to be seen here. The Chapter-House was in existence, and the bases of the pillars were found. We came upon several stone tombs and stone coffins; and we discovered, in front of the high altar, the tombstone which covered the remains of Isabella, wife of Richard Earl of Cornwall, King of the Romans, who was buried there, and beneath were found the coffin and her remains. The stone has been removed to the present church. The cemetery was on the north side of the Abbey.

THE REV. THOMAS HUGO, M.A.—The few remarks which I shall offer on the subject of this evening will apply rather to the artistic than to the architectural portion of it; for although you may reasonably expect to hear more about architecture than art, a word or two on the latter will not be out of place. It was the custom of the monasteries of England to affix one or more seals to the charters and similar documents which they issued, and when, for example, they leased any portion of their lands, a seal was appended to the document. For many centuries this was the all but invariable rule. Those who have consulted Dugdale's *Monasticon*, in its last and best edition, are aware that some charming examples are there given of these ancient seals; and perhaps it will not be wrong to say that some of the finest works of the art of that period are presented in these memorials. Upwards of twenty years ago I was asked to read a paper before a western association on the charters of Cleeve Abbey. I had known the place very well previously, and though the preparation of the paper entailed upon me some laborious work, I was inclined to undertake it in the hope of discovering something new. Apart from many interesting facts in the history of the Abbey, a rich discovery rewarded me. I had to search through ancient rolls and records of many kinds to furnish myself with information as to the charters connected with the place. When the paper was read, I took occasion to express my great regret that I had not been able to meet with any description of the seal. I had hardly finished when a gentleman who was present told the meeting that he had brought with him an old document connected, as he believed, with the Abbey, and he thought it was probable that I should be able to read it. This was handed to me, and I am sure you will sympathise with me in my delight when I found it was a lease granted in the time of Henry VIII., and having appended to it the impress of the ancient seal of the Abbey—a thing then unknown. I had a good engraving of the seal made, and it then became as well known in the monastic history of England as it was unknown in England before. I have brought with me one of these impressions, and I shall be very pleased if you will do me the honour to give it a place in your portfolio. It will be seen that this fine work of art was executed not long after the abbey was founded. The seal, you will observe, represents the Blessed Virgin and the Holy Child under a canopy of the Early English period. The first portion of the Abbey was built in the Early English style, which is faithfully represented in the seal. Below is a monk in a kneeling posture, and holding a crozier. It is pleasant to find architecture and a sister art thus illustrating each other, and I am happy to have it in my power to furnish you with so beautiful an example.

THE REV. W. DENTON, M.A.—As I have but slight knowledge of architecture, and no pretension to any acquaintance with the architectural details of this abbey, any remarks I can offer will be

only of a desultory and general character. I think Mr. Walcott has not pointed out the probable object which the Cistercians had in view in fixing their houses where they did, nor the reason why they chose these special sites. We must remember that the Cistercians were from early times great wool-merchants and leather-sellers. They had extensive privileges for the sale of wool, and I presume the site of a monastery was frequently chosen rather with reference to this than to the beauty or otherwise of the site. It was necessary to choose some kind of labour in which the monks might find employment; and the Cistercian order did this in raising flocks and herds, and in preparing the wool and hides for exportation.

Mr. Walcott has not made reference to any tower at Cleeve. There is a significance in this. In the early statutes of the Cistercian Order (1157) it was enjoined that no tower of stone was to be built in any of their houses in which bells were to be hung; further, that no bell should be of more than 50 lbs. weight, because every bell was to be pulled by one monk, and should not be of such a weight as to require a second person to assist.

With reference to the vast variety in the architecture of Cistercian houses, one thing must be borne in mind; the Cistercians commenced as the most austere of all orders, but I do not think there was any order which fell so rapidly and so completely as the Cistercian. This was owing, I think, in part to the peculiarity of their constitution. In their very first statutes they claimed entire exemption from any interference, and for this purpose it was enjoined that if the Pope or the bishop of the diocese in which any of their houses were situate should direct anything not in keeping with the statutes of the order, they were to be disobeyed; therefore they were freer from any control than any other order, and they suffered accordingly. We find in the Annals of Waverley—the largest Cistercian house in the South of England—that in 1188 a general visitation of these monasteries took place, and the abbots of Tintern, Bordesley, and other Cistercian houses, were deposed. This was cotemporaneous with the foundation of most of the houses of this order in England. Notwithstanding this, both here and on the Continent, the order rapidly declined from its first fervour. In 1340 an attempt to reform the Cistercians was made by Benedict XII., who, having been a Cistercian himself, knew the need in which they stood of those reforms which he projected; and he draws a picture of their moral decay, which is hardly to be paralleled in anything we have of the rapid fall of other religious houses. Benedict XII. in his bull treats thoroughly of the causes of the decline of these houses, and if we accept his statement, the only marvel is that the Cistercian monasteries subsisted, or at all rose from that degradation. In 1444 there was another attempt made under Pope Eugenius IV. at reform, which was carried out by Martin de Vergas with more especial reference to the Cistercian houses in Spain than in this country. Amongst other reforms, I may mention a most singular one. Up to that time the Cistercians had clung to their privilege of receiving the communion in both kinds, and in the statutes of the order we find a sumptuary law by which Cistercian monks were directed to receive the consecrated wine by means of a quill, or pipe of silver-gilt, and not, as in other orders, of any more costly material. This privilege was taken from them in 1446, at the very moment when the communion of both kinds was about to be restored in many parts of the Western Church. With reference to Cleeve Abbey, we are reminded of what Benedict XII. says was the practice of Cistercian houses in general, that their abbots were accustomed to bestow the monastic lands upon their relations without check or control from the monks. That something of this waste took place at Cleeve is obvious from this circumstance. In 1296 twenty-six monks assembled for the election of an abbot, and soon after the number of monks was increased to twenty-eight, by the endowment of Gilbert of Woolavington; yet in 1536, notwithstanding the accession of property to the abbey, the whole number of the monks was but seventeen. In 1184 the lands belonging to the monastery were estimated to be worth 37*l.* a-year; these had increased in value only

6*l.* a-year in 1444, whereas at the dissolution the value had gone up to 155*l.* The increase in the value of the Cistercian lands was probably due, I think, to the impetus given in that century to sheep-farming in this country. The diminished number of inmates of the abbey was a symptom of the decline of the monastic spirit of the country. This made it difficult for the monasteries to keep up the number of their monks, and led them to anticipate in a way the measure of Henry the Eighth. They dissolved their outlying cells, in order to bring up the monks from these establishments to increase the number of the mother-house. For this purpose the abbey of St. Alban's had suppressed several of the cells belonging to it in the north of England, in order to supply the deficiencies of the mother-house. In concluding my desultory remarks, allow me to give expression to my hope that Mr. Walcott will take the opportunity of preserving in some enduring form the valuable information he has collected with reference to Cleeve Abbey.

MR. LOFTUS BROCK, F.S.A., visitor.—At this hour of the meeting my words must be brief, and I will speak as an archæologist rather than as an architect. We see on the walls the illustrations of a true archæological work. I do not mean copied from books, as is often the case with regard to the history of buildings. Mr. Walcott has gone to work with mattock and spade, and the result is one of the most interesting collections I think it has ever been my lot to witness. We have before us, to the best of my belief, the most perfect example of a Cistercian house in the whole of England, one side of the cloister-court being still roofed in; and I re-echo the sentiment that we trust the whole of what Mr. Walcott described may be perpetuated in some form for the benefit of those who come after us. With respect to what can be done with shovel and spade, I need only point to what is now before us. The site of this abbey was most unpromising, but the result is what I think would be the case if other sites were opened out in a similar manner. The site of a Benedictine house at Keynsham, in Somerset—the same county as Old Cleeve—recently came under my notice. It is a building site, nothing would grow on it. None of the abbey buildings existed above ground, and the appearance of the site was most unpromising. Some excavations were made, with important results, which are indicated in the *Journal of the Archæological Association* for 1875. We found the site of nearly the whole of the abbey church, together with a great quantity of interesting pavement. The tiles before us are of very great beauty, but I must say those from Keynsham are more beautiful, being earlier and more artistic. There are, I believe, 500 sites of old abbeys and priories in England yet to be investigated, and I trust the encouragement given to researches of this nature, by what we have heard and seen to-night, may conduce to many other sites being investigated.

MR. E. SHARPE, M.A.—Perhaps I shall best serve the purpose of the meeting if I confine myself to the architectural view of the question—to what, in fact, relates to the interesting discovery of this building, its actual dimensions and proportions, and its plan, as Mr. Walcott has restored it—whilst noting how far that plan does or does not correspond with that of other Cistercian abbeys. And here I may perhaps remark, that it is unfortunate for myself, as well as Mr. Walcott, that the second part of my work on Cistercian Abbeys, which will contain a further treatment of the subject, has been delayed in the press, as it would, I think, have modified some of his views with regard to the general similarity in plan of the whole of these monasteries. On the plate which I hold in my hand, and which is one of those that will appear in that work, are shown the ground-plans of some twenty abbey churches in England, France, Germany, and Spain, all upon the same scale, the advantage of which, of course, architects will recognise, for without it we do not know the value of the example we are considering. As it happens, this little abbey at Old Cleeve is one of the least important of the abbeys of this country. It is a small structure, which appears disadvantageously on that account; nor need we be surprised if in this smaller example we do not find the permanent type uniformly adopted in the larger abbeys to have been followed throughout in this smaller

example. Here and there we find this to have been the case, especially in the buildings of the latter centuries. The fact is, as Mr. Denton has said, the Cistercians fell off in later times, not only in discipline, morals, and diet, but also in architecture; and the rules of the first two centuries were totally neglected in those which followed. I defy Mr. Walcott to show me a large abbey of those two centuries which is not very nearly in accordance with the model here exhibited. It is interesting, indeed, to me to find a building so late as the twelfth century executed so nearly on the same plan. This is the model-plan exhibited by me in this room three or four years ago. I have not, therefore, prepared it for this occasion; you will see, nevertheless, how exactly, on a larger scale, it represents the small example which we have at Cleeve. This model-plan may be looked upon as an aggregate example of the whole of the principal Cistercian abbeys of Europe. It presents the same leading features, and the same leading characteristics that they all do.

I have prepared also a plan on the same scale of what I conceive Cleeve Abbey to have been before it was meddled with and altered in the fifteenth century; it is copied from a wood-cut given in the *Building News* last year by Mr. Walcott himself. Above it is the plan of the building as it exists at present, as represented by Mr. Walcott here to-night. I have, however, taken the liberty of colouring red all those parts of the building which I believe have been altered in the fifteenth century. It is exactly in those parts coloured red that the primitive type is departed from; that is to say, in the position of the refectory, and in that of the Domus Conversorum, which you will see in my own plan I have restored to their usual position. Now I do not know whether Mr. Walcott carried his excavation to such an extent on what I believe to be the primitive site of these two buildings as to convince architects that they did not originally exist there; I feel, however, confident that they did; at the same time I admit there are certain examples in which the refectory is put longitudinally, that is, east and west, instead of transversely, or north and south. Some few examples will be found in which that is the case; but as there is no rule without an exception, I am sure the exceptions are so few and far between that you may take the rule to be almost absolute. In not one of these twenty-one abbeys at all events, which are the largest in Europe, is that the case. The refectory is in all of them at right angles to the walls of the cloister to which it is attached, north and south. With regard to the little room adjoining the sacristy, I am willing to allow that to be an open question. I, however, quite agree with Mr. Walcott when he says it could not be the dead-house. It may possibly have been what Mr. Walcott called it, a "parlour;" but I am more inclined to adhere to my original opinion that it is the penitentiary, for the reason I have already given. However, neither Mr. Walcott nor I must be too dogmatic on such a matter, for it is impossible to refer to any passage in the old chronicles which identifies the terms there used with the rooms we find in the buildings; and in this respect we must always remain in doubt until we meet with a passage which will settle the matter at once.

Then we come to the small apartment next to the chapter-house, which I have supposed may be the 'locutorum.' In this plan there is the very unusual instance of a staircase being carried in the same direction in which you see it here, and I am desirous to know whether that is an original staircase. If so, it is unique, as far as I know, unless the ruined structure similarly placed at Kirkstall be a parallel example.

We next come to a building stretching to the south, but on the east side of the cloister which corresponds in all respects with this long building on the west side of the cloister [pointing on the plan]. This and that are identical in all respects; they consist of two apartments, an upper and a lower; they are alike in their mode of construction; in the division into two aisles, by a row of columns down the middle in the vaulting, and in the carrying of the room above. There can be no doubt that the words 'refectorium' and 'dormitorium,' which we find in old chronicles, were

applied indiscriminately to these two sets of buildings; 'refectorium' meaning the room used by day, and 'dormitorium' the room above it. In all the chief Cistercian abbeys we have these two distinct double-storied buildings. Now of these two buildings, intended, obviously, for the habitation of two distinct classes of inmates, we cannot doubt, I think, that that lying on the west side of the cloisters, and which I have called the frater, '*fraterium*,' was for the use of the monks. They could go by this staircase [pointing] to the room above, through here, along this passage, adjoining the 'scriptorium,' over the chapter-house, and so into the church. It also afforded access to the room above the chapter-house, which I have designated the 'scriptorium' library, or, as Mr. Walcott prefers to call it, the muniment room. It was here that the monks wrote all they did write. I am inclined to think, however, that Mr. Walcott is wrong in limiting it to such small dimensions. I think it more likely that it existed here as at Furness, *i. e.*, over the whole of the chapter-house. To return, however, to the frater. In the early types we have quite the contrary to what Mr. Walcott says, when he calls it the calefactory. The early monks had no fireplaces in this building. I defy Mr. Walcott to give an example of a frater with a fireplace so early as the twelfth or thirteenth century. That fireplaces were adopted afterwards we all know. Whether because the order became degraded or not I cannot say, but they certainly did some very curious things in the fifteenth century. In the early centuries the monks almost lived in the open air. The south end of these fraternities had often open arches, instead of being closed in; but in Furness Abbey the monks of the fourteenth century filled up these openings, and put in fireplaces where there was the open air before. It would appear, in fact, that they lived in a hardier manner in the twelfth century than they felt inclined to do in the fourteenth. Then we come to the place where the term 'calefactory' is admissible. There was always a room with a fireplace in it between the frater and the refectory; it may have been, and probably was, as well the kitchen as the 'calefactory,' where the monks warmed themselves.

Then, again, with regard to the refectory, about which there can be no doubt, except in the case of the few examples I have referred to:—it appears obvious to me that in the fifteenth century they pulled this building [pointing on the plan] to pieces, and put up on the first floor a new refectory, running east and west, instead of the old one on the ground-floor running north and south. We see, indeed, on the front of that building the windows of the fifteenth century. What I would ask of Mr. Walcott is to make further explorations on the site on which I believe the old refectory to have stood, to see whether the traces of it do not exist, as I have here shown, running north and south. Then with regard to the other long buildings on the east side of the cloister, to which I have applied the term '*Domus Conversorum*,' Mr. Walcott says he has never met with a passage in which these words occur. I will give him one which, I think, is conclusive; he will find it in the History of the Abbey of Meaux, published by the Master of the Rolls. It is as follows:—

"Porro idem Abbas Alexander *refectorium Conversorum* ab abbate Thoma inceptum perfecit; et *domum Superiorem eorundem* inchoavit."—*Chronica Monasterii de Melsá*, vol. i. p. 326.

What can be clearer proof that in Cistercian buildings we must expect to find such a building as that above described large enough to provide eighty to a hundred persons with a *day-room** below, and a *dormitory* above? The word 'refectory' has been applied in later times exclusively to the dining-room—the apartment in which the residents assembled for dinner, with seats around it; but we have more than one instance of its application in early documents to the lower story of one or other of these two buildings. I will only further remark upon what I consider

* The word "*Refectorium*," as it occurs in the passage above quoted can hardly be translated otherwise than as "*day-room*," the room inhabited by the "*Conversi*" during the day.

a curious feature in this plan, viz. this curious projection here [pointing], which provided a means of passing from the '*domus conversorum*' into the church. The monks occupied the eastern portion of the church, the guests the middle portion, and the *conversi* occupied the western portion. The access to this portion of the church was thus made convenient, as well from the dormitory as from the day-room. [MR. FERREY.—I have been anxious to know to what use that passage at the west end of the church was put to.] MR. SHARPE.—It is the only instance of the kind I know of. With regard to the suggestion of the reverend gentleman who preceded me that the site of this abbey was selected in connexion with the facilities it afforded for wool-growing, I would remark, that at the time these abbeys were founded I do not suppose wool had much consideration. I should rather incline to the belief that they fixed themselves there from a wish to be out of reach of the business affairs of the outer world, and they chose these secluded valleys for that purpose. In later times the Cistercians, no doubt, became great growers of and dealers in wool, but I do not think that was the reason for the selection of the site. With regard to the authority of the Pope, I am glad Mr. Denton mentioned that, because that is a point of great interest in connexion with the Cistercian houses. They were only allowed to use two small bells. With regard to the terms which Mr. Walcott has attached to different buildings on this plan, such as 'tresaunt,' and 'earols,' and 'chequer,' they must be looked upon as altogether imaginary; and here I must say that archæologists and architects go to work in different ways. The archæologist makes use of a building to illustrate his reading; the architect makes use of his reading to illustrate his building.

MR. WM. WHITE, F.S.A., Fellow.—The conversation has been of such interest that those who have gone before seem to have forgotten what was due to Mr. Walcott with respect to a vote of thanks. I beg now to propose that vote of thanks. I will not occupy your time further than to remark, with reference to the refectory, that I have observed, and I believe it will be usually found that in the early ages they made a special point of placing every building that was essentially secular at right angles to the church, the church being east and west; therefore there is good reason for supposing that the refectory in the case of this abbey would accord in position to the model plan before us. That is our point with reference to the passage in the wall which has been referred to. At Old Goodrich Castle there is a passage through the thickness of the south wall from east to west to a gallery which was evidently for the use of the female portion of the garrison to attend mass without having to go below; and I cannot but think, in these abbeys the portion adjoining the church was used as a hospital; and we must suppose that these abbeys did take care of the sick and infirm people; and this passage was to admit them easily to the western end of the church to attend mass without having to go down stairs.

MR. FERREY.—I beg to second the vote of thanks to Mr. Walcott, and I think we ought to include in it the clergymen who have so kindly given us the benefit of their observations. Our best thanks are also due to Mr. Sharpe for his able remarks. He appears to differ from Mr. Walcott upon a few points, but on the whole they agree in the main particulars.

THE REV. MACKENZIE E. C. WALCOTT, in reply upon the discussion, said, I should have been glad if Mr. Sharpe had had the opportunity of reading my Paper in its entirety previous to making his remarks, inasmuch as in the reading of it to-night, I have been obliged to curtail it very considerably. I beg to say, with regard to Mr. Sharpe's observation, that our archæologists prove our facts by documents; you will find in the notes to my paper ample documentary evidence, from close independent research pursued through many years to prove what I have said. You will find there quotations from the rituals of Spain, France, and England. With reference to my not having read Mr. Sharpe's recent book, I would say that unfortunately I did not purchase it until I had almost completed the exploration of Cleeve Abbey, and then, having lent it to Mr. Samson,

the architect of Dunster, he was so charmed with it, that I could do no less than present it to him. With regard to the assumed transverse wall, parallel with the front of the nave :—after a thorough examination of it, a navvy suggested that we should not have any hesitation about its removal, as he pointed to tiles *in situ*, that were projecting from under some of the stones which were loose and devoid of mortar. The fact was, it proved to be only an old pig-stye wall. Mr. Baker took me somewhat by surprise when he expressed his opinion that Cleeve was a Benedictine Abbey, notwithstanding the documentary evidence furnished by its pedigree, which can be traced to Clairvaux through Revesby, from which Abbot Ralph brought the first community. It is a subject of great gratification that Mr. Hugo, its annalist, has succeeded in obtaining this very beautiful engraving of the ancient seal of Cleeve Abbey. With regard to Mr. Denton's remarks, I state in my paper that at Meaux there were three bells, and at Hayles there were five bells, whereas he laid it down that in Cistercian houses there were never more than two bells. As regards the diminution of numbers in community just before the suppression, you must not stop at the beginning of a story ; you must see it out. As long as these Cistercians did their duty, no matter how poor they were, that is, as long as they did God's work, the monastery was full. It was only when they became lax and colder that their numbers were reduced. It is always the case that where God's work is done, He provides labourers to do it. The novel term 'Fratery,' has been applied by Mr. Sharpe to what I call the calefactory ; the fraternity at Carlisle is still the name of the true frater or refectory. M. de Caumont refers to Beauport as a model abbey of the thirteenth century, to which Cleeve, in its arrangement of this building, closely corresponds. With regard to the position of the refectory, I would assure Mr. Sharpe of the fact that on the spot my attention was repeatedly drawn to the opinion held by him, and I am delighted to discuss the matter with him to its issue face to face. No trench would reveal earlier foundations, lying north and south ; I would therefore expunge the red line in his plan which he suggests as its later axis if he would permit me, for the substructure of the whole refectory is Early English, and the original refectory was of the thirteenth century ; the former is thoroughly Early English, and the refectory was merely rebuilt in the sixteenth century. I think if I can produce examples of a certain number of refectories placed east and west, and if Mr. Sharpe produces a certain number running the other way, it is proof that both positions existed and co-existed. We have a number of other abbeys which have been swept away, and their evidence is unhappily lost. Mr. Sharpe differs from me about words. I want him to give his authority for the use of the term, the 'day-room.' I never heard of it thus applied by any previous writer in my life. I believe it to be a modern introduction : in the first instance, perhaps, in the penitentiary at Westminster. With regard to the term 'domus conversorum,' I have the passage on which he relies in my paper here ; 'Refectorium conversorum, et domus superior, scil. dormitorium eorumdem : ' 'the refectory of the converts, and the upper-chamber, namely,—the dormitory of the said converts.' The fact is the passage mentions only the *domus superior* of a two-storied building, and not a distinct *domus conversorum*. I challenge the assertion that Mr. Sharpe has found in it the words, *domus conversorum*, used as a comprising term for these two chambers for converts. The words, "*domus superior*," relate to the upper room, and cannot be converted into 'domus conversorum.' There was no *domus conversorum*, except that for converted Jews in London, and you cannot find another example of the name. With regard to the number of converts, Beaulieu sent twenty monks and ten converts to colonise Hayles ; and ten monks and four lay-brothers to Newenham. Kirkstall, at its foundation, had twelve monks and ten converts : Meaux in the fourteenth century contained forty-two monks and seven converts 'in conventu : ' but the converts were dismissed or resigned, and the household was reduced to 'mercenarii servientes.' I go on to say further, the number of converts has been over-estimated, and a misapprehension of

their true condition, and the fact of their dispersion of the majority into granges spread like lesser monasteries over the estates, has led to the very improbable theory that honoured guests were displaced from their own immediate neighbourhood by respectful hosts, the monks, in order to give room to servants and labourers. The monks were kept at home for their proper duties within their cloister, and for that reason the number of the converts was multiplied as the lands increased in extent and cultivation. With regard to the day-stairs in the centre of the east alley of the cloisters, I produce the parallel instance of Valle Crucis.

The vote of thanks (as supplemented by Mr. Ferrey) having been carried by acclamation,

The PRESIDENT said—I have much pleasure in conveying primarily to Mr. Walcott, but equally to Mr. Sharpe, and to those reverend and other gentlemen who have done so much to enrich the discussion, our hearty and earnest thanks for the instructing and interesting evening which we owe to them. At this late period of the evening I will not attempt to throw any light upon the vexed questions which have arisen. As regards this '*domus conversorum*,' I had the happiness, the year before last, to hear Mr. Sharpe lecture on the subject, first at Ripon, and afterwards *in situ* at Fountains Abbey. I confess I was at the time myself one of the *converted*; and so far as concerns the refectory of the 'converts' improved its practical qualities by an excellent refection within its walls, of which all of Mr. Sharpe's converts heartily partook. 'Who shall decide when doctors disagree,' and when gentlemen equally learned take opposite views? With regard to the position of the refectory of the monks, it is most remarkable that one gentleman—a great doctor—brings forward some twenty or more examples in which this apartment runs *north* and *south*, whilst another equally conversant with the subject brings forward a long list of instances in which it runs *east* and *west*. What are we to say to this? We can only come to the conclusion that there was no absolute rule. I must differ from what Mr. White says, viz. that in the Middle Ages they took pains not to place those buildings east and east which were appropriated to secular purposes. True, they placed those for sacred uses *east* and *west*, but I do not think they cared much about the position of secular apartments. The Benedictines were as much acquainted with the customs of their age as the Cistercians; yet at Westminster, Worcester, Durham, and very many other monasteries, you find the refectory placed *east* and *west*, so that it would appear that there could be no religious feeling on the subject. Whether the Cistercians acted upon convenience or habit and custom, one cannot tell, but it is evident they did not follow any absolute and invariable rule in this respect. I think, as architects, we are extremely obliged, not only to Mr. Walcott, but perhaps more especially to Mr. Sharpe, for having brought under our special notice, not only now but on former occasions, the grand simplicity and purity of the architecture of the early Cistercian monasteries, from which we may learn many most useful lessons. They show us that fine and noble architecture may be obtained without the use of ornament. The earlier Cistercians built under conditions forbidding the introduction of sculpture, forbidding stained glass and painting upon the walls, and almost all extraneous ornaments of architecture; and yet they erected structures which are hardly excelled in grandeur. Take the instance of Kirkstall. What admirable architecture that church displays, and yet how absolutely simple it is! One sees it is the work of one who threw his whole soul into it, and yet the building is as simple as simplicity can be. This is a great lesson for us all—perhaps to myself as much as any one—and we should remember the saying of Solomon, 'Put a knife to thy throat if thou be a man given to appetite.' I may just add, that I am informed that Byland Abbey, one of the most magnificent Cistercian abbeys in Yorkshire, is about to be similarly explored, under the superintendence of the Yorkshire Architectural Society, and that we may expect from it great and interesting results.

The discussion having then terminated, the meeting broke up.

Royal Institute of British Architects.

At an Ordinary General Meeting of the Institute, held on Monday the 14th of February, 1876,
SIR GILBERT SCOTT, President, in the Chair, the following Paper was read:—

ON THE ERECHTHEUM.

By J. FERGUSSON, D.C.L., F.R.S., Fellow.

ALTHOUGH I am perfectly well aware that the subject of Greek architecture has become far from being fashionable in this country, I cannot bring myself to believe that any apology is necessary for bringing it again before you this evening. It may not have the variety and picturequeness of Gothic art or its constructive cleverness; nor can it, perhaps, rival the works of the Egyptians in massive grandeur, or in the *quasi* eternity of their aspirations, but for elegance of proportion, and refinement of details, Greek architecture is still unrivalled by any known style; and I cannot but believe it would be a misfortune to the architects of this or any other country if they ceased to appreciate the high intellectual qualities that characterize every feature of Greek architecture.

Hitherto the reproach most generally urged against Grecian art is its coldness and uniformity. It is said when you have seen one pillar of a Grecian temple you have seen all. When you have seen one side or one end you have seen the other side or other end. Every part, in fact, is so like the other that they have been reproached as “machine made.” Even this, however, is only true of Greek temples as we build them, or Greek ruins as we now find them. When first built they were principally designed as frame works for sculpture and painting, and half their merit consisted in the perfect manner in which the three arts of sculpture, painting, and architecture were combined, so as to aid the general effect without interfering with the province belonging to the sister arts. When, for instance, the Parthenon was adorned with sculpture and paintings to the extent it certainly once was, the variety must have been as great as the harmony was perfect. As we now see it the reproach may to some extent be justified, and, as little remains to us of Grecian art except these great temples, it is not easy to defend the style generally against the charge of too great uniformity. If we had examples of their smaller temples, and knew more of their civil and domestic building, the task, I fancy, would be easy. At all events the building I propose bringing before you this evening is as irregular as any Gothic building that ever was built at one and the same time; as full of anomalies as any building ever erected, and anomalies that would be faults if they were not motived. They are such as no modern architect would be pardoned for committing, but which, when their “*raison d’être*” is understood, become beauties, and add immensely to the perfection and interest of the building. The truth of the matter appears to be that the mediæval architects attained to just that stage of architectural design which is exemplified in the Erechtheum, where every part of the building is motived, but to a great extent subordinated to constructive necessities or practical convenience. The Gothic architects never rose to, or dreamed of that far higher stage of design which is exemplified in the Parthenon where all constructive necessities or questions of convenience are subordinated to purely æsthetic considerations.

It was in such temples as the Parthenon that the Greeks showed that they, and they only, had

grasped the ideal of a higher and nobler form of architectural art than had dawned on any nation before or since. But all their buildings do not aim at this high standard. The Erechtheum belongs to a second and lower class, very beautiful and elegant, but more like one of the varied works of nature than the produce of pure intellectual labour.

Like most works of nature, however, even the most perfect when first or ignorantly examined, they appear full of anomalies, and of parts and organs that seem either useless or superfluous. As the knowledge, however, of the naturalist or anatomist increases all these anomalies disappear. A use is found for every part, and the result is that finally every one feels certain that if he has not found a use and reason for everything, it is owing to his own stupidity and want of knowledge, and not to any defect in the work before him.

It is the same with the Erechtheum. It is only because it has not been studied with that care and that absence of bias which are indispensable in these investigations, that everything about it is not known, but I hope before I finish this evening I may at least be able to show that there is a prospect of most of the difficulties of the case being cleared away, and with them a good deal that has been written regarding the monotony and formality of Greek Temples.

It cannot, however, be said that the Temple of Minerva Polias has not attracted sufficient attention. Ever since its plan was first published by Stuart in 1787, it has been a bone of contention among antiquaries. Volume after volume has appeared in rapid succession, and numberless essays have been written to explain its peculiarities. Among our own countrymen Inwood takes a leading place, and he went to Athens principally, apparently, to force its secret from the building itself. Wilkins also spent much time and pains in its investigation, and Colonel Leake applied to it his keen critical spirit, but in vain. Wordsworth, Walpole, and a host of others have tried their hands at it; and last but not least, Mr. Newton, of the British Museum, has essayed, but unsuccessfully, to read the riddle.*

Among the Germans, some of their best scholars and antiquarians have tried their hands upon it, Among these it will be sufficient to name Ottfried Müller, Tiersch, Böckh, Rangabé, Forchhammer, and several others have essayed the venture, but certainly in vain. One of their number, Herr Hettner, exclaims: "We cannot help lamenting, therefore, that the ravages of time have rendered any "complete understanding of this fine structure apparently for ever impossible." And again: "The "mystery of the composition is without a key. Its discussion is important, but it may be predicted "that it will lead to no conclusive results."†

Among the French, too, many distinguished authors have proposed theories of restoration, but hardly more successfully than their neighbours. Raoul Rochette wrote a most elaborate essay on the subject in the "Journal des Savants." A M. Tetaz spent two years in Athens, mainly occupied in its investigation, and M. Beulé, late Minister of Public Instruction, in conjunction with him, proposed a restoration which is on the walls, and will serve to illustrate the class of thing that in their despair antiquaries are forced to accept.

In it the goddess Minerva, who was certainly the principal personage to be enshrined, is relegated to a small cell 16 feet by 24. Erechtheus and his friends are turned out into the verandah, and two-thirds of the building are devoted to the nymph Pandrosos, who was certainly the most insignificant of the lot. Worse than this, in order to accommodate the laurel, the roof is taken off the great part of the temple, and the Greeks are represented as having adopted the most unusual expedient of having

* It ought, however, in fairness to be added that Mr. Newton did not himself attempt a restoration of the temple. He adopted that of the German Böckh, which he thought sufficient for his purpose, which was to translate the inscription he was publishing in his Collection of Greek inscriptions.

† Athens and the Peloponnesus, pp. 94, 95.

ACROPOLIS D'ATHÈNES * RUINES DE L'ERECHTHEION ETAT ACTUEL

Echelle des Orpes 1 2 3 4 5 6 7 8 9 10 Mètres
Echelle du Plan 1 2 3 4 5 6 7 8 9 10 Mètres

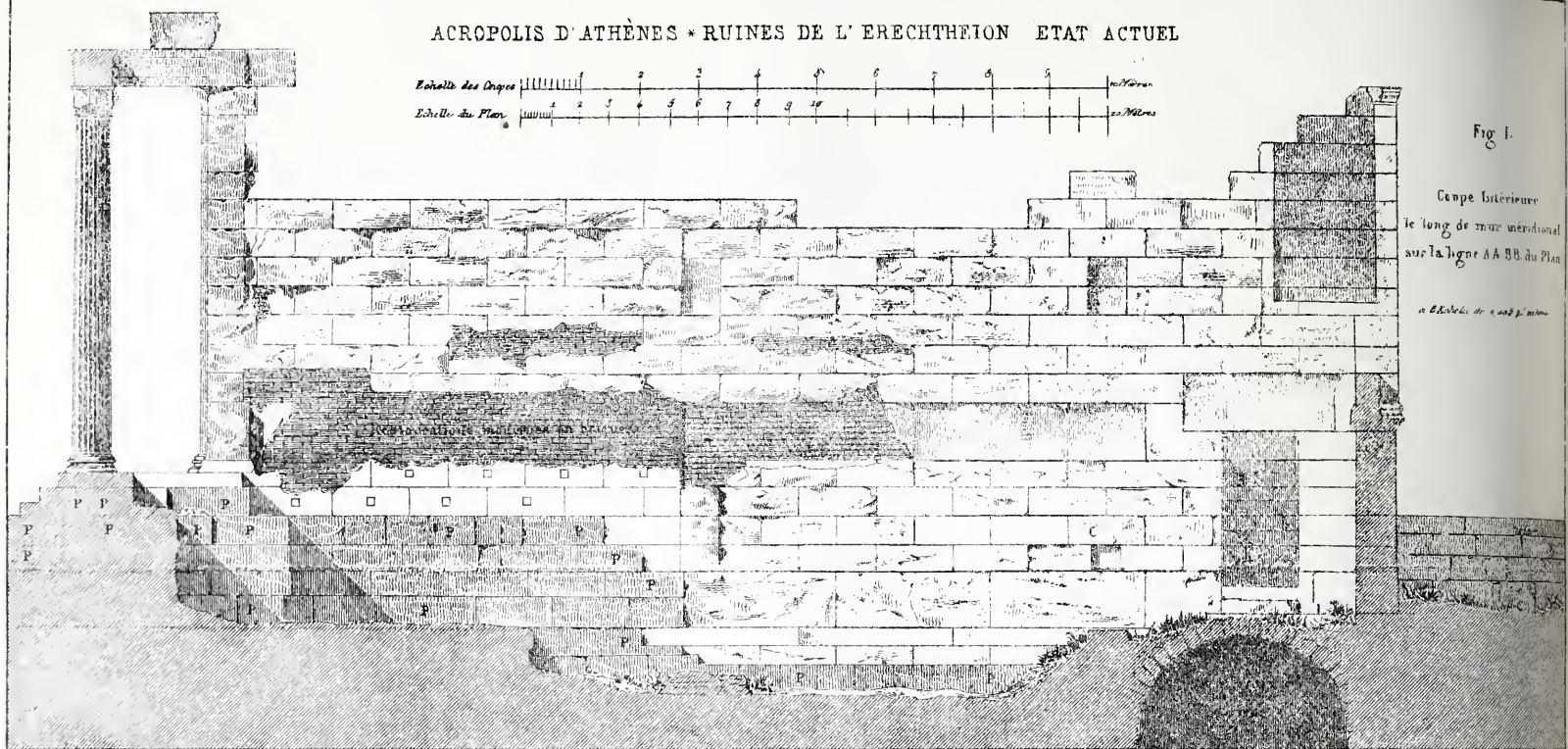


Fig. I.

Coupe Intérieure
le long de mur méridional
sur la ligne AA BB. du Plan

à l'échelle de 1 mètre

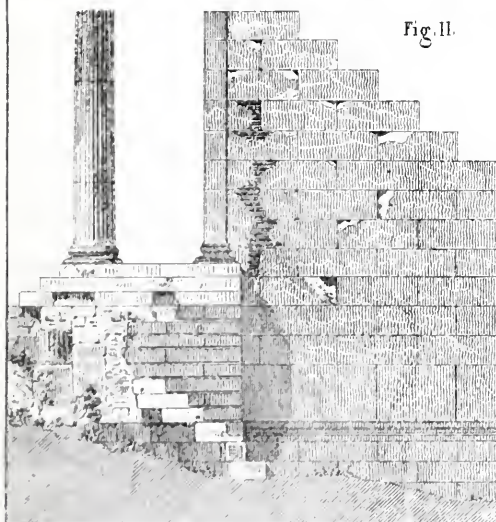


Fig. II.

Partie de la façade latérale Septentrionale indiquée E F sur le Plan à l'échelle de 0,008

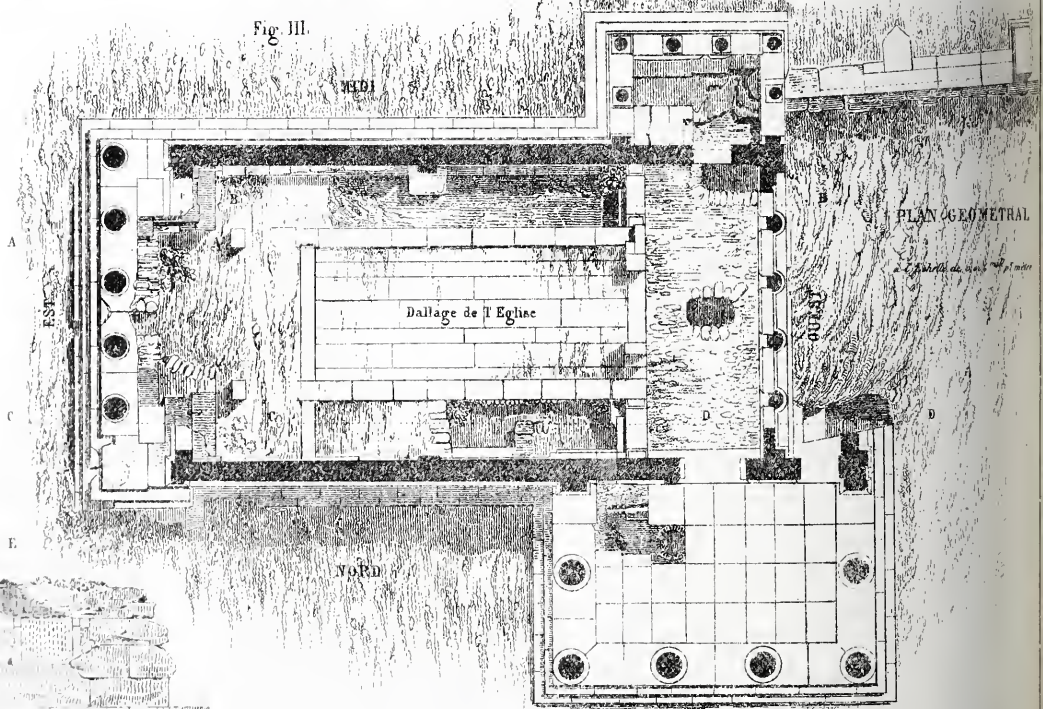


Fig. III.

PLAN GEOMETRIQUE

à l'échelle de 1 mètre

Dallage de l'Eglise

NORD

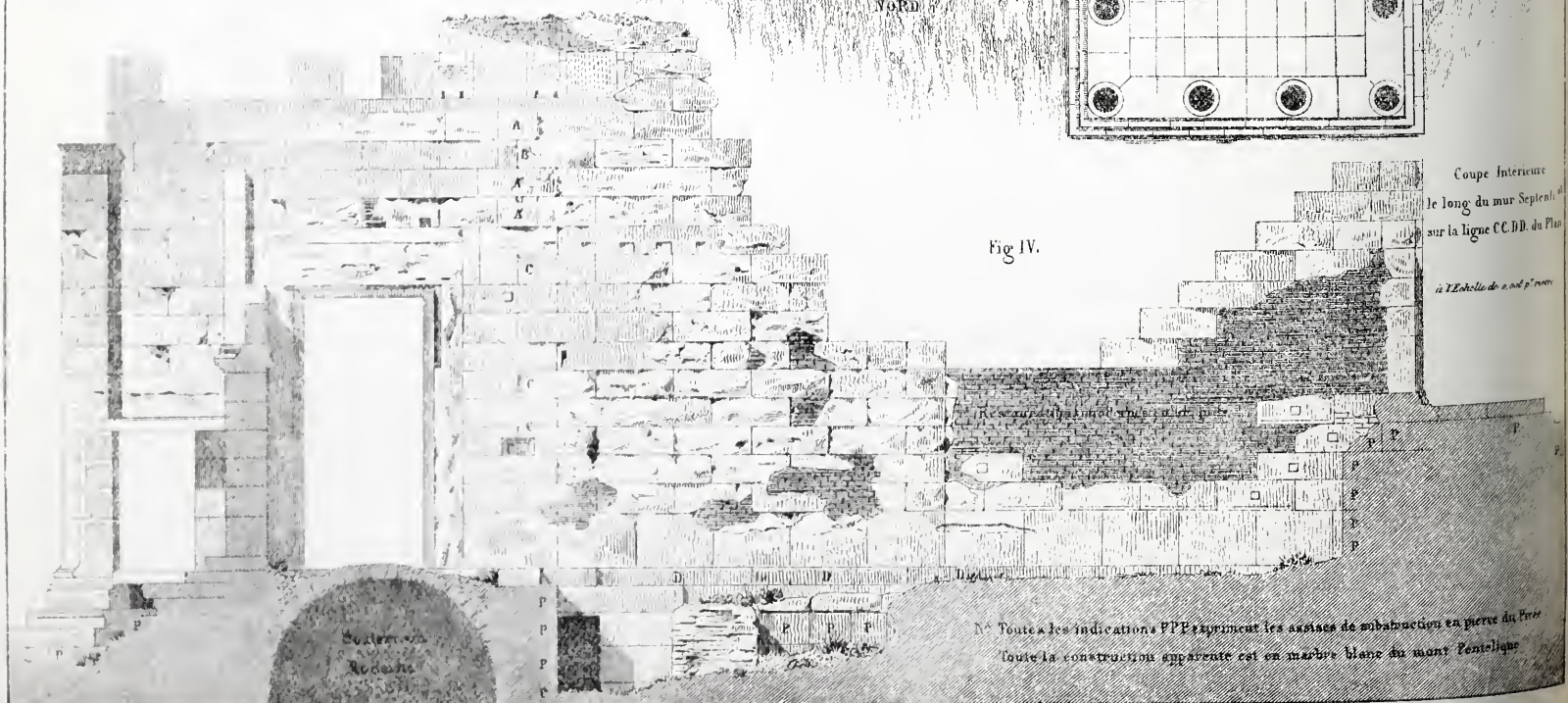


Fig. IV.

Coupe Intérieure
le long du mur Septentrional
sur la ligne CC DD. du Plan

à l'échelle de 1 mètre

Toutes les indications PPP expriment les assises de construction en pierre du Pire
toute la construction apparente est en marbre blanc du mont Pentelique

introduced three windows in the western wall to light an open courtyard! After all these failures—and failures they certainly are, for no one has ever found a seconder, and these despairing vaticinations, you will be amused when I tell you that I see no difficulty in the matter, and that I fancy I can explain every important arrangement and every detail of the building. The truth is, as Herr Hettner says, it is an enigma, but like most riddles very clever men may guess a long time in vain without hitting on the true answer, but once they are told it, it is so simple that every one wonders they did not see it at once. In this instance the riddle is this: There were at Athens three temples, grouped together on one spot. First and foremost that of the goddess Athené Polias; next, that of the hero Erechtheus; and lastly, that of the nymph or virgin Pandrosos; and their relative importance must be in the order in which I have enumerated them, the last named having no title to the honour except from her being a lady devoid of curiosity. Be this as it may, the difficulty has been, that both from Pausanias and the remains on the spot, we learn that the existing temple was only double, or contained only two apartments; and the difficulty has always been how to get three temples into two rooms. It is like the school boy's puzzle, how to get three pints of wine into a quart bottle. The answer is simple. It cannot be done, and it is no use trying. In the same manner my answer to the Athenian riddle is equally, it cannot be done, but, as shown in the diagram on the wall (Plate I), the Temple of Pandrosos was not in the house we now see, but was attached to it externally to the westward. If this hypothesis is admitted there is literally no difficulty in the case, and my business, therefore, this evening will be to show to you the grounds on which I have formed my belief that it was so, and I shall be very much disappointed if I fail in establishing this point to your satisfaction.

Before proceeding further allow me first to explain the authority for the drawings used for this restoration. The first is a photographic reproduction of a plate published by M. Tetaz in the *Revue Archéologique* for 1851. I would not, however, have placed implicit confidence on it, were it not that three years afterwards the Archæological Society of Athens, at the request of some Germans, appointed a commission of five of their most eminent members to draw up a report on the subject. They employed a competent architect to make the necessary drawings. Most of these are on the walls, and they agree with those of Tetaz so completely in every essential particular, and also with those of our countryman Inwood, as far as they go, that I fancy they may be implicitly relied upon. The only difference I have been able to detect is that on a stone in the interior of the north wall Tetaz leaves one of the knobs which the Greeks used in setting their stones, while the commission represent it cleaned off, and they probably were right. In all other respects they agree. In addition to these I have some dozen of photographs of the building, some of which I produce, and they confirm the drawings so completely that I cannot conceive there is any doubt about the facts I am going to bring forward.

The written data for this conclusion are principally contained in two documents. First, the description of the building by Pausanias, which must be taken as absolute, as far as it goes. In other words, nothing can be admitted that contradicts it, but, as Colonel Leake remarks, he is frequently so concise as to be obscure, and it consequently is not always easy to follow him, but with the extensions I propose I fancy even this difficulty may be got over.

The other document is a specification of additions and repairs required to be done to complete the building. It seems that in 409 B.C. it was found that all the money available for such purposes had been devoted to the completion of the Parthenon, and that this building had been neglected. A committee was consequently appointed to examine and report, and their report was engraved on a marble slab brought home by Dr. Chandler, and now fortunately in the British Museum. It is, however, only a specification for repairs, and I hope I may say without offence, even in this room, that such documents are not always easily intelligible, and when not accompanied by drawings, or if the person attempting to explain them has not an intimate knowledge of the buildings they apply to, they are generally very

difficult of interpretation. In this instance, instead of drawings we have only the shattered remains of a Greek temple that was afterwards converted into a Greek church, and subsequently used as a Pasha's residence, and lastly as a Turkish storehouse. With the extension I propose I hope, however, to make even this intelligible, and, with a few additional paragraphs from other authors, to clench the argument.

First then, with regard to Pausanias, I propose, in order to avoid any suspicion of twisting his meaning to meet my views, to read to you the passages bearing on this subject from a translation made by a competent scholar, and published in 1794.*

After visiting the east end of the Akropolis, and describing various objects that interested him there, he goes on to say: "In the same place, too, there is a building which they call Eretheus, and in the vestibule of it there is an altar of Jupiter the supreme, upon which they do not sacrifice anything animated, but, placing a certain kind of cakes, they at the same time forbid the use of wine on the occasion. But entering into the edifice there is an altar of Neptune, upon which, in compliance with an oracle they sacrifice to Eretheus, and an altar of the hero Buta, and a third to Vulcan. On the wall there are paintings pertaining to the family of Butadaë. But the building itself is twofold, and contains a well of marine water, which is by no means a circumstance extremely wonderful, since the most inland inhabitants, and particularly the Aphrodisienses in Caria have wells of this kind. There are certain writings, however, extant which assert that when the south wind blows this water yields the sound of waves, and in the rock there is the representation of a trident; but these circumstances are said to evince the contest of Minerva with Neptune for Attica." (p. 75.)

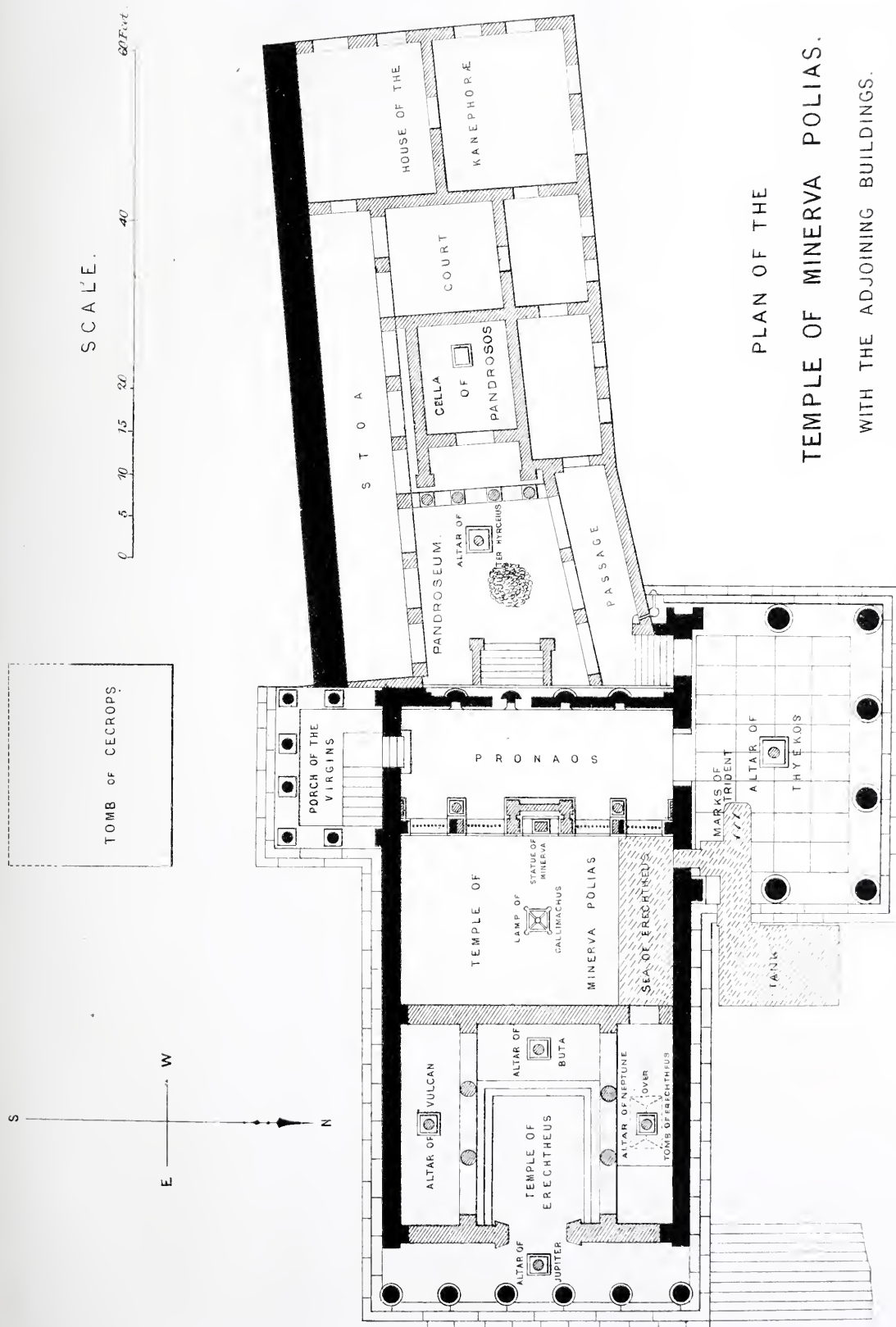
If we pause for one minute before going further we find we have here first a temple of Eretheus, with its four altars, but not one word about Minerva, or anything connected with her; and after describing the temple and all that it contains, he abruptly remarks that the house is double, and in it is the well of salt water, &c. If we might supply—the house is double, "and having described what is in the first part, I will now proceed to tell you what is in the second," all would have been clear, or if he had merely after double added, "and in the second part is the well," it would have sufficed; but I think that something of that sort was intended from his making the remark when he did. At the beginning or end of his description it might have been otherwise. In the middle it certainly seems he meant something of the sort, but the thrift of words with which Leake reproached him prevented his adding what would have made all clear.

Be this as it may, the sea or well of saltwater was certainly in some part of the subterranean passages lightly hatched in the plan Plate I. They are all underground, viz., below the level of the floor, and communicate with one another by passages through the foundations of the portico, and of the temple itself in manner that could only be intended for some priestly "supercherie" of the sort. I am afraid the place has been too completely skinned in the recent excavations to admit of the part where the salt-water tank was, being now determined with absolute certainty; but I fancy it was inside the temple, near the tomb of Erechtheus whence it obtained the name of *Θάλασσα Ερεχθίδα*.†

To proceed, however, with our author. "But the most holy of all the images is that statue of Minerva, which by the common consent of all the towns before they connected themselves into one city, was dedicated in that place, which is now called the Tower (Akropolis) but was then denominated the City (Polis). It is reported that this statue fell down from heaven, but whether this was the case I will not at present attempt to prove. Callimachus made for the statue of the goddess a lamp of gold, which when filled with oil burns day and night for a year." "Above the lamp was a brazen palm tree, which rising to the roof dissipates the fumes" — a tolerable proof the building was not

* Description of Greece by Pausanias, translated from the Greek by Thomas Taylor. London, 1794.

† Herodotus VIII, 55. Apollodorus III, 14, 1.



PLAN OF THE
TEMPLE OF MINERVA POLIAS.
WITH THE ADJOINING BUILDINGS.
AS RESTORED BY M^R J. FERGUSSON

hypæthral. He then proceeds to describe a wooden statue of Mercury, the gift it is said of Cecrops, a folding and jointed bedstead, the work of Dedalus. The coat of mail of Masistius, and a Persian scimitar that belonged to Mardonius. All these things were in the same temple as the images, with probably many others he does not allude to. Having finished with them he then adds as abruptly as about the double house. "With respect to the olive they report nothing concerning it, except that it serves as a monument to prove the contest of Minerva for Attica. They likewise assert that being burnt when the Persians took the city from the Athenians, blossomed the same day to the height of two cubits. "But the temple of Pandrosus joins to that of Minerva, for Pandrosus alone of all her sisters was faithful to her trust." There is nothing in this to indicate absolutely the position of the tree; but as we know certainly from a remark of Apollodorus,* that this tree was in the Pandroseum the mode in which the tree and temple are mentioned together here seem singularly significant. He then goes on to say, "The particulars, however, that appear to me most admirable, and which are not generally known, I shall take upon me to describe. There are two virgins that dwell not far from the temple of Polias and who are called by the Athenians Canephoræ." (p. 77.) He then proceeds to describe the mysterious journey these maidens made once a year to the temple of Venus in the city; but as they have no reference to the Temple it has no interest for us here.

Before leaving Pausanias if you will just for one moment follow me on the diagram Plate I, you will see how easily and how naturally all he says follows from the arrangement now proposed. The temple of Erechtheus with its altars; the Salt Sea at the northern entrance of the temple of Athené; the tree in the Pandroseum near its western door; and the house of the Kanephoræ, near the stairs leading down to the city. All these coincidences may not be sufficient to prove absolutely that I am right; but it does prove that there is nothing in Pausanias at all events that contradicts my views in any way. Those, on the contrary, who insist in crowding all into the present building are forced either to ignore the temple of Erechtheus altogether, as Beulé does, and to put his altars into the portico, while Pausanias says distinctly they were in the house itself; and they are obliged to assign two-thirds of the building to the Nymph Pandrosos, leaving poor Minerva with a very shabby cell—16 by 24. According to the view now put forward the area of the temple of Minerva is, as nearly as may be, double that assigned to Erechtheus, and is ten feet more lofty. Pandrosos is relegated to a small cell outside, and the whole thus forms a group, the various parts of which are perfectly consistent with the relative importance of the various personages to whom each are assigned.

When from Pausanias we turn to the Inscription† we find it commences with a preamble of seven lines in which the temple is described as that containing "the old statue," evidently that of Minerva just described, shewing that the surveyors, at all events, considered that as the principal temple. The name Erechtheus does not occur in the inscription anywhere.

From line 8 to line 68 they describe the various repairs wanting in the building we now see, as it then stood, beginning with the cornice and the parts above it, Maschaliaia, Epikranitides, and other hard-named parts that I will not trouble you further with at present. They then describe the Epistylia, and the frieze of Eleusinian stone that surrounded the whole building, then the pillars and walls that wanted fluting and polishing, and end with stating that the entire base all round the building is unpolished. Having completed the external survey they devote the next twenty-four lines to the interior of the building, where a good deal of polishing and work was still required, but which

* Apollodorus III, 14, 1.

† This inscription has frequently been published in English works; first by Chandler himself; afterwards by Walpole, in his *Travels in Turkey*; by Wilkins, in his *Prolusiones Architectonicæ*; and lastly and best by Newton, in his *Collection of Greek Inscriptions*, in the British Museum, 1874.

I have not time to enter on here, further than to direct your attention to the altar of incense or Thyekos, which stood in the portico opposite the great doorway (line 79).

Having thus finished all that was to be attended to in the building as it then stood, they proceed to specify (line 93 to line 155—62 lines) work that required to be done on stones, not in position, but lying on the ground. These are of no interest to us here, as stones belonging to one part of the building may be found lying near another, and in no instance except the last, when two corner stones belonging to the eastern portico are mentioned, is there any allusion to the places they belonged to.

If the inscription stopped there all the essential parts might be identified without difficulty, as they belong to the parts of the building now standing. But the remaining thirty-six lines present a difficulty no one has yet been able to get over. The stones, or most of them, are in position, and cannot be identified with any part of the main building. If you admit the existence of a Pandroseum independent of the main building the difficulty vanishes. But to this we shall return presently.

Although I wish to avoid quoting Greek, or attempting to discuss the niceties of Greek phraseology in a lecture like this, there is one small matter I must allude to before going further. It is the meaning of the proposition *πρὸς* when used with the genitive *του*, or the dative or ablative *τῷ*. In the former case Newton translates it "towards," "facing," "opposite to," "or over against." In the latter "near to," "adjacent," "at," or "next to," each meaning quite sufficiently near to the others as to be at times interchangeable, and quite in accordance, I believe to all that is found in the lexicons: at all events, sufficiently so to justify these meanings being adopted on the present occasion.

This being so we find at line 44 the following heading. "Of the columns on the wall *towards* the Pandroseum. The four attached columns have one foot and a half of the Anthemion of each column uncut, measured from the inner side."* Now in this instance there can be no possible mistake as to the columns meant, nor any, apparently, as to the meaning of *πρὸς*. There are no other columns on any wall, and no others attached, or that could be measured from the inside. It seems impossible to escape the conviction that the engraver of the inscription meant to describe them as facing the Pandroseum. Either, it seems to me, it must be considered that the *πρὸς* has no meaning at all, and might as well be omitted, or that entry is in itself sufficient to prove that the Pandroseum was attached to the west front of the temple, *συνεχής* as Pausanias expressly tells us it was.

Even if it were omitted, and it were contended that the wall with the pillars on it, were the western and not the eastern wall of the Pandroseum, you only get, like Beulé, into the difficulty of devoting two-thirds of the main building to the Nymph, and relegating the Goddess to the insignificant eastern cell. As, however, it is not omitted, but is there, I see no escape from the conclusion that the Pandroseum was in front of the wall with the attached columns.

After this there is no passage in the inscription bearing directly on our subject till we come to line 143, when four stones from "The Stoa" are mentioned among those lying unfinished on the ground. What and where this Stoa was, no one has yet been able to explain. Böekh suggested that it must be the great northern portico, but as Leake very properly remarked, it is very unlikely that a part of the building which had already been described as "The portico facing the great doorway" should in the same document be mentioned under another name. Newton suggests that the stones may have been taken from some destroyed Stoa, to be worked up for the new building; but as we shall presently see, this view is equally untenable, as the Stoa is mentioned a little afterwards as an important building belonging to this group.

* The first part of this translation is Newton's, the rest that of Raoul Rochette in the *Journal des Savants*, Nov. 1851. The words are *Τῶν κιόνων τῶν ἐπὶ τοῦ τοίχου τοῦ πρὸς τοῦ Πανδρῶσεϊου. IIII κειμένων κιόνων κ.τ.λ.*

At line 156 we come to a new heading, which is most important. It refers to "Stones on the wall at the Pandroseum." The stones are no longer on the ground, and certainly do not belong to the wall with the attached columns before alluded to. That, we have done with long ago, and besides, they are not such as could possibly be applied there. They are, "one $7\frac{1}{2}$ feet long, $3\frac{1}{2}$ feet wide. The smoothing work half finished. One 6 feet long, $3\frac{1}{4}$ feet wide, and $1\frac{1}{4}$ feet thick on the wall of* the Pandroseum; of this 5 feet of the Astragulus is not carved." What that Astragulus is we see from that under the feet of the Koræ, where parts are carved and parts are not, and it certainly formed the crowning member of the south wall of the west enclosure, wherever that may have been.

The next four entries refer to the Stoa, and as they are important I quote them entire, using Newton's translation:

"Six pedimental stones from the Stoa, 7 feet long, $3\frac{1}{2}$ feet wide, and 1 foot thick. These are half-finished.

"Two others 5 feet long, $3\frac{1}{2}$ feet wide, and 1 foot thick, half worked.

"The stones of the Corona on the pediments $2\frac{1}{2}$ feet wide, $4\frac{1}{2}$ feet long, and 1 foot thick; one of these worked smooth.

"Another of which the smoothed work is half finished."

How this stoa with its pediments was arranged, I do not know, or pretend to know. A week's excavation would probably tell us more than months of speculation. All I contend for here is that it was an important building in connection with the wall of the Pandroseum, and that granted, any one may arrange its details as he pleases.

In the diagram Plate II. I have drawn a half pediment to shew how possibly it may have been arranged; but if I were attempting a detailed restoration I would rather believe the inscription refers to front of the cella in which I suppose the statue or the altar of the nymph Pandrosos may have been placed, at the west end of the enclosure in which the olive tree stood.

The next entry is a difficult one—line 180. It is this: "Four stones of the doorway—literally four stone doors—*θύραι λίθιναι*— $8\frac{1}{4}$ feet long, $2\frac{1}{2}$ feet wide; of these all are finished, except the "zuga," into which the black stones had to be inserted." Wilkins describes these stones as doorframes, and I believe he is correct. At all events in the Pandroseum, as I restore it, there are two doors upwards of 8 feet high by 4 feet wide, one leading to the Temple of Athené, and one to the north portico, and they are in walls $2\frac{1}{2}$ feet thick, so that these stones, if linings, would exactly suit them, and their use is not explicable on any other theory which has yet been suggested.

The next entry is, "One parotis of the lintel of the Eastern door is half finished." This is evidently not the eastern door of the Erechtheum—that we have done with long ago—but one of the Eastern doors of the Pandroseum; nor is it difficult to see which, for that leading to the great northern portico is not centred, but would require a bracket or console on the north side to bring it into the centre of the composition.

The next entry is a new heading, and concludes the inscription. "The Pentelic stones for the altar of the Thyekos. Three of these 4 feet long, $2\frac{1}{2}$ feet wide, and 1 foot thick. Another 3 feet long." If, therefore, my view of the matter is correct, we have been working round the Pandroseum from the portico of the Koræ on the south to the altar of the Thyekos on the north, and if this is so every word of that last part of the inscription becomes clear and intelligible, while no other hypothesis yet proposed suggests even a plausible meaning for any one of its sentences.

§ The "of" is Newton's. He objects, too, to the repetition of the expression "on the wall of the Pandroseum" as needless. The fact, however, is that the first is a new heading—a rubric in fact—to warn the reader that we have done with the *ἡμιεργα*, or half finished work on the ground and are beginning a new chapter by describing an independent building.

So far, therefore, as this inscription is concerned, it appears to me not only to confirm my views, but not to be intelligible in any other hypothesis yet suggested. The other written notices are equally, or even more satisfactory. The principal of these is an anecdote told by Philochoros, to the effect that on a certain occasion a bitch strayed into the Akropolis, where it seems dogs were not admitted, and, being chased, took refuge in the temple of Athené, and thence rushed downwards (δῶσα) into the Pandroseum, where she took refuge on the altar of Jupiter Herceios.*

This is just one of the pieces of collateral evidence which is so important in these inquiries that it is impossible to neglect or overlook it, and the consequence has been that those who have attempted to restore the temple, finding the eastern half 10 feet higher than that of the western part, have nearly all felt constrained to call the first and smaller part the temple of Minerva, and to assign the greater and more magnificent western part to the nymph Pandrosos. There seemed no escape from this and the other manifest absurdities this hypothesis led them into. If, however, the restoration now proposed is adopted, the floor of the Pandroseum, being rather more than four feet below that of the Temple of Athené, the bitch would equally rush downwards into the Pandroseum through the open door in the western wall, much more naturally than by the back stairs usually provided for her accommodation.

There is no doubt about the tree being in the Pandroseum,† and this coupled with the assertion of Athenæus, that the altar of Jupiter Herceios was always in an open air place,‡ seems to me sufficient to settle the question. It was not in a house, as one might, from botanical reasons, suppose, but in an open court, as common-sense would seem to dictate.

In conclusion, I may, perhaps, be allowed to refer to a passage in the Æneid which has frequently been quoted as supporting the theory that the tree was or might have been inside the temple. It is—

“ Ædibus in mediis, nudoque sub ætheris axe
Ingens ara fuit: juxtaque veterrima laurus
Incumbens aræ, atque umbra complexa Penates.” §

Now, although it is no doubt true that “ Ædibus ” may describe a single temple, in this case the context seems to imply rather the courtyard of a palace, or some such place; nor does it seem that “ nudoque sub ætheris axe ” can be applied to a chamber even if lighted from the roof. The real meaning of the passage seems to me to be rather that the tree with the altar stood in an open court surrounded by edifices of some sort or other. In other words, just such an arrangement as is here proposed, and some such Virgil probably had in his eye when he wrote it.

These are, I believe, the only important passages bearing directly on the subject, that are to be found in any authors, and consequently, so far as the “ litera scripta ” is concerned, not only is there nothing that contradicts my views, but there is a great deal that cannot be explained, or, at least, has not been, by any theory hitherto advanced; but it may well be asked, If this is so, are there no material remains left to confirm these views? My answer is, there are many; and I have no doubt many more will be found when looked for; but no one has suspected the existence of the Pandroseum where I have placed it, and consequently no one has looked there for its remains. The first and most important indication of its existence is the small doorway under the north portico, to the westward of the great door of the Temple of Minerva. No one, I fancy, can study the plan of the temple without being struck with the singular clumsiness with which the northern portico is shoved—I can hardly use a more dignified word—past the end of the building, one-third of it having no backing at all. No modern architect would dare to commit such a solecism, and it must have required some very strong

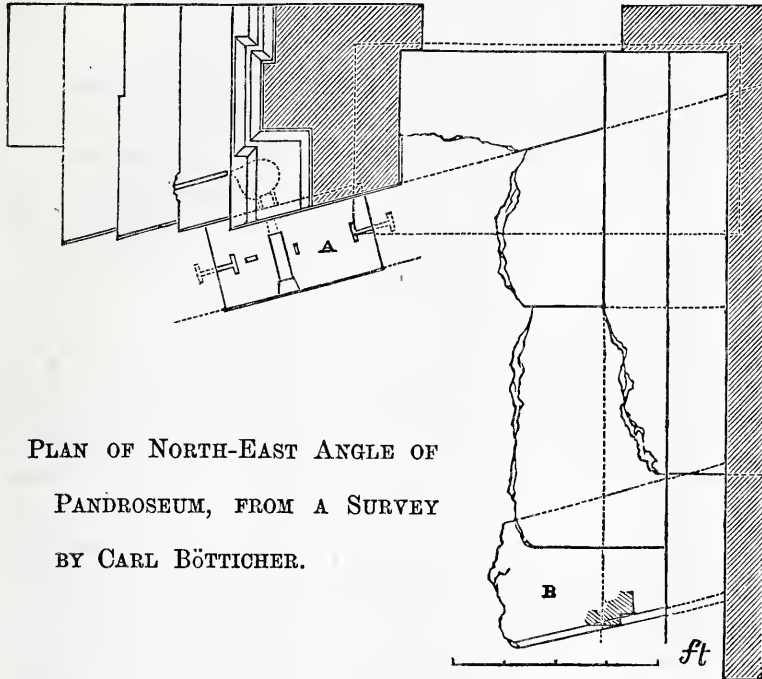
* Philochoros in Dionysius Halicarnassus, p. 113, ed. Sylburg.

† Apollod. III, 14, i.

‡ Athenæus v., p. 189. ἐπὶ τῶν ὑπαίθρων τόπων.

§ Æneid II. 512.

motive for a Greek to tolerate it. The moment, however, we assume the Pandroseum was where I have placed it, the reason is self-evident. The north portico was intended to cover the entrances to the temples of Athené and Pandrosos, two-thirds or three-fourths were appropriated to the first, and one-third



PLAN OF NORTH-EAST ANGLE OF
PANDROSEUM, FROM A SURVEY
BY CARL BÖTTICHER.

or one-fourth to the second, and this being done gives purpose and meaning to the whole arrangement. Besides this, when we enter through the small door, it is not so completely "en l'air" as at first sight appears. In the first place, the vestibule is roofed by a large stone 8 feet by 4, which is still in position, and formed part of a covered gallery that extended some way westward. The proof that this was so will be gathered from a careful survey of the ground by Bötticher,* which is shown in the annexed woodcut, and by an elevation of the west wall by the Commission of the Archæological Society of Athens, published

in their report above referred to, and which is now on the wall. Though neither observed what the other did, they both agree in showing that, a distance of nine feet from the western pier, a wall or colonnade, the foundation of which is shown by the stone marked B, started at an angle of about 13 degrees from the western wall of the temple, and the indications on the wall show that a roof was there in continuation of that now existing. But the great proof is that Bötticher (as shewn at A in the woodcut) found a drain or sink passing through the north wall, and turning westward, ending in a bronze mask, on the second step externally.

I do not know what may have been the case with Greek temples, but I know in the East wherever there is an altar in a temple where offerings are made, it is always thought necessary to provide an ornamental spout by which the refuse of the libamina may be passed outside. These are frequently richly carved, and always considered important, and this one seems as if intended to serve exactly the same purpose to the altar of Jupiter Herceius, if I am right. At all events, it proves absolutely that the place where it starts from was enclosed, and that there was no other means of passing to the outside the refuse of what was used within.

On the other, or southern side, the indications are nearly if not quite so complete as on the north. In the first place the inside of the retaining wall, which here extends to about 80 feet, is so rough and rude that it is impossible that any wall could be allowed to be seen in the Akropolis in such a state. It must have been covered up. But how? We would probably have battened it, and covered it with lath and plaster, but even this hardly without covering it with a roof. How the Greeks did it I don't pretend to say. That it was hid I feel certain, and that it formed the back of the Stoa seems to me hardly doubtful. At the north end of it there is a sinking in the west wall of the temple, which all have remarked, but no one knows quite what to do with it. It is covered by the largest stone in the building, 4 feet 9 inches in height by 14 feet in length, and evidently, therefore, considered important.

* Bericht über die Untersuchungen auf der Akropolis zu Athen in 1862. Berlin 1863.

Inwood felt this, and consequently inserted a staircase here, for which he had no other authority or use, and no one else seems to have been able to offer a suggestion. To me it seems clear it was the end of the Stoa, but in what manner it actually fitted into the groove can probably only be ascertained on the spot.

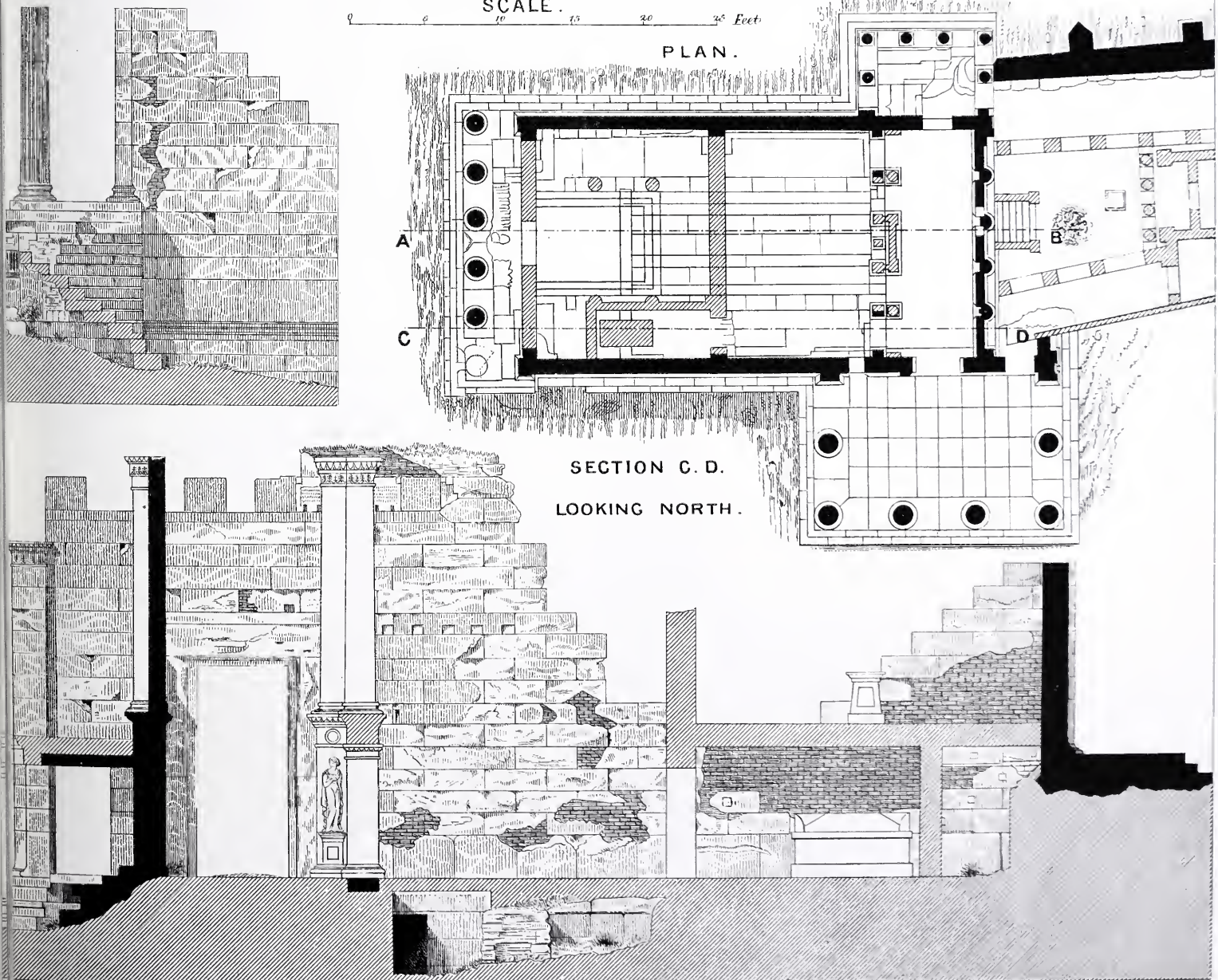
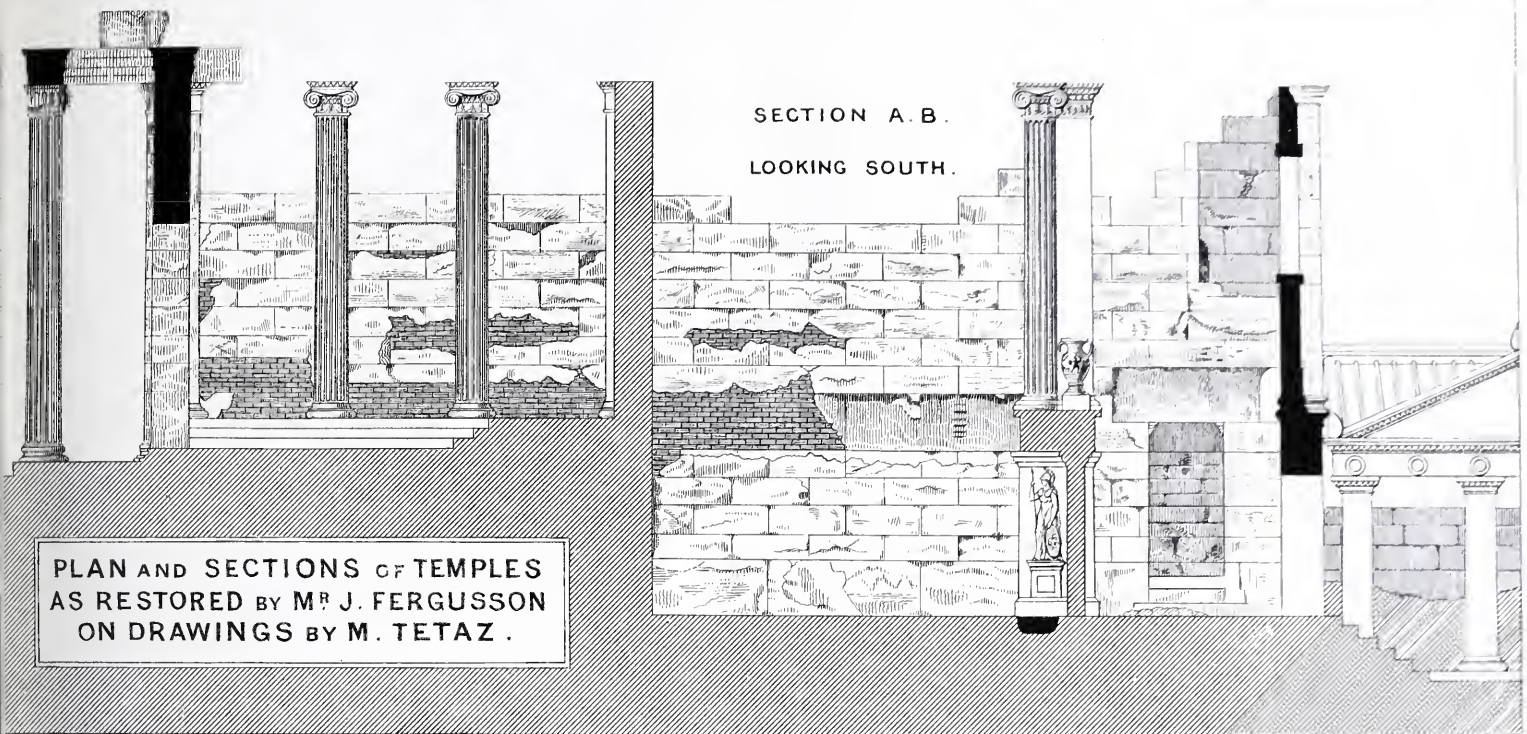
From the indications on the spot, and the difference of the height, it seems almost certain that the Stoa had a sloping roof, as shown on the diagram, but in that case we might expect to find a chase cut in the wall, or some marks of its apposition. It must be remarked, however, that the wall of the Stoa is not at right angles to the wall of the temple. There was consequently a small triangular space which just freed the one from the other, and prevented an awkward contact, or a fan-like spreading of the tiles, which, to a Greek architect, would have been inadmissible. I can see fifty ways in which the junction could have been artistically effected, but it is no use dwelling on them now, as it is only in the spot that the way in which it was actually done can really be found out.

Be this as it may, the "instantia crucis" of the hypothesis is the doorway in the western wall, leading from the Temple of Athené. If there had been no powerful diverting cause, it would have been in the centre under the central window. It is under the second engaged column from the south—but not even exactly that—but a little more towards the north. In fact, as regards the temple itself it is architecturally nowhere, but as regards the markings on the wall indicating the presence of these two porticos it centres exactly. Now, it appears to me that all these curious anomalies cannot possibly be accidental. They must have been put there for some purpose or other, and whatever that may have been, they seem to me to prove incontestibly that the space to the westward of the temple we now see was occupied by a sacred building or enclosure, and if this is so, I cannot suggest any other than the Pandroseum, which we know from Pausanias was attached (*συνεχής*) to the Temple of Minerva. How far the Temple of Pandrosos may have stretched westwards, or what form it took I neither know or pretend to know, nor in the present stage of the inquiry is it at all necessary that it should be known. Its existence in all that is wanted should be conceded, for that alone explains all the rest and the investigation of its details may safely be left to the spade, and to those on the spot, who have access to indications that are not available to those who are strangers to the ground.

Assuming for the nonce that the arrangements of the building in plan were such as I have just described, the architectural ordinance of the interior is a matter of no difficulty and of very little uncertainty. Beginning as before with the Eastern apartment I have introduced into it four pillars; though as both the east and west walls were entirely removed by those who converted the building into a Byzantine church, there are no indications left of the pilasters that would have corresponded with them and proved their existence. Without them, however, the form of the room would be offensively awkward for a temple, being 32 feet wide and 24 feet deep, and with the entrance in the longest side. By dividing it into three aisles the harmony of proportion is restored.

With regard to the floor levels there can be no mistake. The pavement of the side aisles, at least, was formed of long stones tailed into the wall like the steps of a stone staircase, and besides this must have been dove-tailed or cramped together in a manner we would think very unnecessary. This is evident from the fact that the upper surface of all the stones of the course on which they rested on either side has been broken by violence. Not only have the floor stones been wrenched out of the wall and their places filled up with modern brickwork, but it has been done with extreme violence to the stones that supported them.

From the diagram Plate II. it will be seen that the underside of these floorstones are on the same level as the cill of the entrance doorway, and as they were in all probability one course of nineteen inches in thickness it is evident that three steps must have existed somewhere. They may have been in the entrance, but there they would have been singularly awkward and unarchitectural; arranged as



shewn in the plan Plate I. they would aid the architectural effect of the temple very considerably, and give dignity to the altars, which were the principal objects in the place.

The architectural arrangement of the Temple of Minerva are equally easily understood, and even more certain. The temple was a hall, nearly square, being 32 feet by 35 feet east and west, and divided by a screen into a Pronaos and Adytum. Besides being considerably larger, being situated on a lower level, it was ten feet higher than the temple to the eastward of it. At a distance of 12 feet 6 inches from the inside of the western wall both M. Tetaz and Professor Lewis found the bases of four piers belonging to this screen, two were attached to the north and south walls in the form of pilasters, corresponding exactly with the antæ on the outer face of the western wall. The two others were centred equally with the first and fourth of the attached columns in the same wall, and it is easy to see that the two centre ones had been removed to admit of the introduction of the central nave of the Byzantine church. Supposing, however, that this is open to doubt, as regards the lower part of the screen, the design of the upper part admits of no question. On the inside of the upper part of the western wall there is, or was when Stuart drew it, a range of six pilasters, corresponding exactly with the antæ and pillars on the outside of the same wall. Now I take it to be a law that admits of no appeal that when an architect places a range of pilasters on a wall of a room or passage ten or twelve feet wide, he must place either pillars or pilasters on the opposite side to correspond. I know of no exception to this principle in either ancient or modern times. In this instance it could not be a solid wall with pilasters, because the three windows in the western wall were certainly intended to light the space beyond, and they must consequently have been pillars. The screen, in fact, was an exact reproduction of the architectural design of the western front, omitting the solid parts, and this seems in accordance with one of the most important principles of architectural designs—That the exterior should suggest the interior as nearly as the altered purposes will admit of.

Before leaving it there is one slight peculiarity about this screen that remains to be explained. The two doorways at either end of the pronaos centre with one another, but not with the screen, which is two feet further from their centre on the east than on the west. I cannot account for this, otherwise than by supposing that either in part or in whole the screen was doubled, and I think I can discover a reason for its being so in the centre. From Dio Cassius† we learn that the image (the old image), faced eastwards, because it is reported that when Augustus died it was found turned to the west. Now it is impossible that so sacred an object could have been placed against the outer wall in the pronaos between its three doors; but if we double the screen in the centre and make the central compartment solid, we not only gain an appropriate niche for the Goddess, but get over the architectural difficulty.

The existence of this screen serves further to explain an anecdote recorded by Herodotus,† which has hitherto been a stumbling block to commentators. It is there said that when Cleomenes was in possession of the Akropolis he on one occasion wished to pay his respects to the goddess, but on entering the Temple and wishing to penetrate to the Adytum, the priestess rose from her seat and forbade him, because he was a Lacedæmonian. Whether the reason was a good one or not is not the question. The fact of there being an Adytum presupposes a naos or pronaos, and that no restoration yet given to the world has been able to afford.‡

It seems, further, more than probable that the Adytum was separated from the pronaos by a grille between the piers; but this is a detail which, like many others, may be settled by exploration on the spot, but which would only complicate the inquiry at its present stage, without adding to or detracting from the main facts which it is the object of this lecture to establish.

* Dio Cassius, liv. 7.

† Herodotus Hist. V, 72.

‡ It is hardly necessary to remark that this anecdote refers to an earlier time than the rebuilding of the Temple as we now see it. But this and most of its peculiarities arise from the fact of its being a restoration of the Temple burnt by the Persians, rather than a rebuilding.

It only remains now to point out the position of the two tombs, which are the only objects not yet touched upon, which have any bearing on this restoration. There seems no doubt about that of Erechtheus. Below the floor line on the southern wall in the eastern temple it will be observed from M. Tetaz's drawings, and more clearly from those of the Commission, that the foundations are composed of rough blocks of stone from the Piræus up to the floor line of the central part, and above that of two courses of marble unpolished, and from which the knobs used in setting them have not been smoothed off. On the north side the case is widely different. The floor line of the lower temple is continued to the eastern wall, and for three-fourths of the distance the marble is polished, and the knobs cleaned off.* There was evidently, therefore, a chamber here ten feet high, and from the markings on the floor probably between six and seven feet wide. I have cut it off by a transverse wall at a distance of sixteen feet from the entrance because beyond that the marble is unpolished and the knobs reappear. Besides that, if a live serpent were kept in the temple—and I believe there was—it is necessary to provide an abode for him, and if so I know of no place so appropriate as this, in the immediate neighbourhood of the tomb of the serpent god Erechthonios.

The position of the tomb explains why the well of salt water was called the Sea of Erechtheus. It is said because it was near his tomb—and so we find it—and thus the position assigned in my restoration to these two objects mutually confirm each other.

The position of the Cæropium, or tomb of Cærops, may, I fancy, be easily determined from the following entries in the inscription so often referred to above. Adopting Mr. Newton's translation, they are as follows:—Line 8: "We have found incomplete the following works of the temple, at the angle *near* the Kekropion." Line 56: "The wall facing the south is unpolished, except the part within the portico *adjacent* to the Kekropion." Line 60: "The pilasters are unpolished from without all round the building except those in the portico *at* the Kekropion." Line 84: "At (or on, *ἐπὶ*) the portico *near* the Kekropion the three stones of the roof above the Koræ had to be polished to a length of 13 feet by 5 feet in width."

From these it seems evident that the portico with the Koræ or virgins, at the time the inscription was engraved, was known only as the prothesis attached to the southern wall, and near the Kekropion, but certainly not the Cæropion itself. The fact appears to be—the ground on the south being higher than the floor of the temple, the architects found they could not make a dignified direct descending entrance from that side, but were content to construct a convenient one, and made it as ornamental as they could by introducing these Koræ. Where the tomb of Cærops really stood, is easily perceived from Mr. Penrose's plan of the Akropolis. At a distance of 12 feet in front of this portico the rock is levelled for a space of 24 feet by 20, exactly where from the indications just mentioned we would expect to find it, and there seems little doubt marks the spot. In addition to these local indications it may be mentioned that the passages in the Fathers which refer to these two tombs all describe the tomb of Erechtheus as in the temple of Minerva itself,† but speak of that of Cærops as in the Aeropolis, and in such a manner as to lead to the presumption that it was a separate building standing near but unattached to the Temple of Minerva.‡

* In Tetaz's drawing one is shewn near the western end, but as it does not appear in the drawings of the Commission I fancy it must be by mistake.

† Clemens in Protreptico. Τι δε Εριχθονιος ; ουχ ἐν τῷ νεφ̄ της Πυλιαδος κεκ̄δευται. Arnobius, bib. vi. translates this "Erichthonios Conditus scribitur in Poliadis fano." Apollodorus bib. II. has Εριχθονίου δε ἀποθανόντος καὶ ταφέντος ἐν τῷ τεμένει της Αθηνῶς.

‡ 'Αθήνησι δὲ ἐν τῇ Ακροπόλει τάφος ἐστὶ Κέκροπος. Clemens in Protreptico. Arnobius translates this, "Athenis in Minervio (in the precincts) memorant sepultum esse Cæropem." Theodoretus Therap. lviii. has Κέκροπος ἐστὶ τάφος παρὰ την Πολιούχον αὐτήν. Juxta ipsam urbis præsidem Minervam.

I have now cursorily run through all the authorities whose existence I am aware of, whose writings bear on the subject in hand. I have not, of course, quoted one-half them, as it would be tedious to do so, and difficult to follow in a lecture, but I have looked up and taken into account every reference I have found in any German, French, or English book I have had access to, and I can honestly say that I do not know one single passage that is in any way at variance with the views, have just enunciated, nor one that is not easily and naturally explicable by the adoption of the hypothesis I have just been explaining.

In like manner I have carefully examined every stone of the building now standing, in so far as the drawings and photographs at my disposal would allow, and I do not know of one whose employment I cannot be accounted for according to this view, and whose use does not seem plain and intelligible. I cannot help, therefore, feeling convinced that the separation of the Pandroseum from the building now standing, which contained the temples of Minerva and Erechtheus, is the true solution to the enigma which has so long perplexed scholars and antiquaries. It is possible, however, that I may be deceiving myself, and may have overlooked some important point bearing on the subject. If so, we shall probably hear of it in the discussion which I hope will follow; and with this hope I leave the matter with perfect confidence in the hands of the Meeting.*

PROFESSOR DONALDSON, Past-President (responding to the President's invitation) said,—It is so long ago—about half a century—since I visited these temples, at that time under the Turkish rule. It was with a view to make a study of the building in the Acropolis, and I have forgotten a great deal about them, although a few years ago I paid a cursory visit to this spot. As you know, I more particularly studied the doorway, some drawings of which I published in my work, on “Ancient and Modern Doorways.” At the time of my first visit the tetrastyle portico, which was very magnificent, was converted into a powder magazine, enclosed with walls, as shown in Stuart and Revett's Illustrations, but we could only get at the door through a hole in the top of the walling, and we were obliged to carry lighted candles. I spent two or three days in taking measurements of that doorway, which was very beautiful. There was such confusion all around—there was so much rubbish covering the whole area of the temples that we were unable to ascertain what the divisions were. It was only by studying the indications of the face of the walls that we could understand where the transverse walls ran. The temple since then has been much destroyed, particularly the tetrastyle portico, which was afterwards blown up by a bomb, but Mr. Fergusson *ex pede Herculem*, from a very small base has built up a theory, which is very ingenious, and his imagination has no doubt lent a great deal of reality to what may not exist at all. We are, however, much indebted to our friend for introducing to us a new theory. As he says, very clever and learned men of different countries have visited this structure, and have been particularly anxious to show what these temples really were; where the divisions existed, the difference of levels of the upper and lower temples, &c., and some investigators have imagined a side staircase descending from the upper to the lower level. Mr. Fergusson does not

* Since this lecture was delivered Mr. A. Murray, of the British Museum, has drawn my attention to a paragraph in the *Academy* of the 19th instant, in which he described a map of the Akropolis he had just received from Professor Michaelis, of Strasburg. I have since seen that map—the only copy, I believe, that has yet reached this country—and am not a little gratified to find that so eminent an authority agrees with me as to the position of the Pandroseum on the westward of the existing building. He, in fact, plants the tree exactly where I do, and though we differ very widely as to the architecture of the Pandroseum and the internal arrangements of the existing temple, on this one cardinal point he seems to have as little doubt as I have. If this is conceded, as with this endorsement probably will be the case, a great deal of the rest follows, as a matter of course; and what remains to be decided is of comparatively little importance, and may safely be left to be cleared up by enquiries on the spot.

think that was the correct way of going down from one temple to the other. It is curious to note these differences of levels in the temples, and that the ancients should have chosen to build in such a strange position. I had the pleasure of bringing home with me some of the glass eyes, now deposited in our cases, which I found in the torus of the capitals of the columns. I think it was a late style of art, but of the highest execution, because it is richer in decoration than the Ionic temples of Asia Minor, whose date is well known. I was surprised at the date of 409 years B. C., which Mr. Fergusson assigns to it. I should hardly have thought it to be so remote. [Mr. Fergusson. It is on the inscription.] Of that I was not aware. I am somewhat astonished to think that in a Greek building there should be an oblique enclosure wall on one side instead of a parallel one, it being so contrary to Greek principles. With regard to the evidence of this block of stone mentioned by Mr. Fergusson, I believe Professor Lewis has seen it, and it was that which led to the supposition that the wall went in an oblique direction. But that does not affect the question, for if it run parallel it would not alter Mr. Fergusson's theory; but as I have already said, it is not very difficult, *ex pede Herculem*, to form a brilliant theory. Mr. Fergusson has looked through every known authority on the subject, and I am sure we all feel much obliged to him for deep research and ingenious solution. I beg, therefore, to propose a vote of thanks to Mr. Fergusson, as beginning what I hope will be an interesting discussion by those who have seen this building in recent times.

Mr. J. C. PENROSE, M.A., Fellow.—It may not be so long since I saw the building on the Acropolis as Professor Donaldson, but it is more than thirty years: therefore, my memory of these matters has become very rusty. In the next place, when I was there I did not deeply study the architecture of the Erechtheum, as I found plenty to do with the Parthenon and the Doric Temples, which formed my principal object. Moreover, I found the investigation of the Erechtheum in extremely good hands, for at that time M. Tetaz, whose work has been referred to by Mr. Fergusson, was engaged on that temple, and who as my friend Mr. Wilson can also testify (and we had frequent opportunities of observing), was evidently extremely careful and conscientious in his researches. It therefore seemed unnecessary to me to devote much time towards elucidating the enigma of these remarkable structures. I had always thought the theory generally propounded of the triple form—"the putting of three pints into a quart bottle," was one of great difficulty, so difficult indeed, that I was inclined to leave it alone unless I had made up my mind to go deeply into the subject, and, as far as I can say with regard to what Mr. Fergusson has told us, there seems to be nothing which is contrary to reasonable hypothesis. In the usually propounded theory, the difficulty with regard to the olive tree, seemed to me insuperable, viz., of its being placed inside a temple lighted by three windows, and this troublesome theory about the tree interfered so much with the space, that some writers were led to place the temple of Minerva Polias in the eastern compartment, which is more properly the Erechtheum. Some doubts have been expressed as to the obliquity of the walls of the inclosure—the Pandroseum according to Mr. Fergusson. This, I think, is not a very serious difficulty, because we find Greek individual temples are not built parallel to one another. The Erechtheum and the Parthenon have different axial lines. I think the Propylæum is parallel to the Parthenon, but certainly neither parallel to the Erechtheum, nor to the pedestal of the statue of Minerva Promachus. I am not aware that I can advance anything further, but I hope to hear some more upon the subject. I have no doubt Professor Lewis will favour us with some observations, and in order that he may be induced to do so, I will, with his permission, delegate to him the duty of seconding the vote of thanks which has been proposed by Professor Donaldson.

Professor T. HAYTER LEWIS, Fellow: It is with very great pleasure that I second the vote of thanks to Mr. Fergusson for his very interesting paper. Like Professor Donaldson and Mr. Penrose,

it is a great many years since I was at Athens, and I would not trust to memory as to the then state of the Erechtheum. But I made careful notes on the spot, because I found that the drawings of Inwood and Stuart did not represent the actual state of the building as I saw it. One cannot, of course, decide, without a good deal of thought, as to so important a subject as this, but Mr. Fergusson's ingenious restoration certainly to my mind gets over a great deal of the difficulty which previously existed with regard to the Erechtheum. The irregular lines noted by Professor Donaldson may possibly be accounted for by the fact that the Erechtheum, though re-built in the finest period of Greek art, was on the site, or nearly so, of the old temple; and it is possible the old lines might have been kept in this particular building, which does not so absolutely form a part of the temple as that of Minerva Polias itself. One or two things occur to me as supporting Mr. Fergusson's theory; but I ought first to mention that any one looking at the drawings of the building as it exists, and without explanation, might be led to a contrary conclusion. For on each of the north and south sides there is deep trench extending from the open screen which Mr. Fergusson has shown, westward of the temple, to the division wall; and it would appear from this that Mr. Fergusson must be wrong, because he takes no account of these gaps or trenches, and carries a level floor from side to side. The fact, I believe, is, that they were never intended to be seen from the top. Their inner retaining walls were in each case in a rough state, and not built in such a way as even to allow of them being covered over with the well-known fine Greek plaster. Besides this, the marble sill which rested on these walls was rebated, and I have no doubt, therefore, that the trenches were covered over by large slabs of marble which fitted into the rebate on one side, and rested upon a set-off in the wall on the other side, and therefore Mr. Fergusson has properly, as I conceive, given a level floor over the whole space.

Professor DONALDSON: What is the level of the slabs?

Professor LEWIS: The rebate would bring them flush with the top of the floor.

Mr. FERGUSSON: It is shown here, as Professor Lewis states.

Professor LEWIS: The centre wall shown by Mr. Fergusson does not exist, but there was in Stuart's and Inwood's time, and also when I visited the place, the clear marks of a wall at each end. The centre part is destroyed, so we cannot tell what the length might have been, but the beginning of a wall at each end is clear. As regards the screen wall westward, I am afraid, from what I have heard, that it has been destroyed. When I was there—which was after the building had been cleared, but before much repair had been done—I noticed that this part was different from anything that I had seen drawn, so I had made careful measured memoranda of it and other parts. There were three openings (one in the centre and one at each end), not doorways, for they had the usual bases of antæ, showing that they were pilasters without windows or door. I differ from Mr. Fergusson somewhat as to the spaces between these doorways which he has shown open, whereas I have distinct memoranda that they were walled up; but Mr. Fergusson's restoration will scarcely be interfered with by this, because the wall was broken down to a low level, and might, therefore, have been originally carried up no higher than the sills of the outer windows, and thus there would have been carried out in the screen the design of the outer wall. With respect to this outer west wall I take it to be an anomaly in Greek art, and I know of but one other example of windows in a temple, viz., at Girgenti. The intercolumniations there are so wide that architrave stones could scarcely have been got large enough to span them; so the Greeks built up the spaces between the columns and then pierced the wall with windows, which were necessary under such conditions. Mr. Fergusson's restoration would account for windows at the Erechtheum, because his centre wall would entirely deprive the western part of light, were it not for the windows in the outer wall to the west. One other point only I would remark upon, viz., the extraordinary position of the beautiful northern portico. It is built partly against the building

and partly not, and the only reason for that which has commended itself to my mind is that it was so placed to give importance to the small doorway at the side of the grand one. This again supports Mr. Fergusson's restoration, as the small doorway would then lead to a part sacred, though less so than the main part. I may add that I have found out, from recent discoveries, that on one occasion during my researches there I unconsciously trespassed upon a very interesting spot, it being no other than that which bore in the rock the marks of Neptune's trident. I beg to second, with great pleasure, the vote of thanks to Mr. Fergusson.

Professor DONALDSON: I would suggest whether this style of portico was not for the purpose of having the doorway of the portico in the centre line of this narrow passage?

Professor LEWIS: Professor Donaldson may, of course, be correct; but if that were in their minds, I imagine that the Greeks would have designed something a little more adapted to the site, and probably something beautiful, as they did on the opposite side of the building.

Mr. W. WATKISS LLOYD, Visitor: I have very few remarks to offer; but I am happy to respond to the President's invitation. Before coming here I had the curiosity to turn to the account of the Erechtheum, by Attfried Müller, the great German archæologist. He has propounded a theory about this building, which Mr. Fergusson has entirely demolished, and in doing so I think has given a good illustration of the manner in which a skilful interpreter of architectural evidence may correct a very great Greek scholar. Attfried Müller places the Pandroseum on the south side of the temple, identifying it with the projection surrounded by statues of girls supporting an entablature; and it is within this that he assigns the place for the sacred olive tree. I own that I have been in the habit of supposing this view to be correct. The olive tree in question is called by eminent writers "the depressed or crooked olive tree," as if it were stunted, and I had imagined that this might be the consequence of confined growth under a roof. It seemed that it might be naturally placed in such an open building with a south aspect; and there seemed to be a poetic appropriateness in the figures of girls standing round, as it is probable, holding water jars, especially as Pandrosos, by the significance of her name, was herself a nymph of dew. But, as now appears, it is certain that no space was left for earth within the basement to render it possible for a tree to have ever grown there. That demolishes Attfried Müller's theory so far. Moreover, when we turn to the description of Pausanias we find that he distinctly speaks of the *naos* of Pandrosos. Now, a *naos* is specifically a house or place of residence, and the term is never applied to a portico of any kind. Again, in the inscription that strange projection is called a *prostasis*, the same term that is applied to the northern and eastern porticos, and not *naos* at all. That was overlooked by Müller. Had he paid a little more attention to his text he would have had at least a better chance of anticipating our friend Mr. Fergusson. And when we go over the cited inscription with due care, and compare it with the details of the structure, especially as now elucidated, it is manifest that here again previous translators have been at fault, and that it expresses distinctly—not that the wall-bearing attached columns was that of the Pandroseum, but that it was in front or in the direction of the Pandroseum—a very different thing, indeed. I therefore can entertain no doubt that the ancient inscription—the testimony of the traveller Pausanias, and that of the at last intelligible remains—bear out that the Pandroseum was another *naos* attached or adjacent to the building, and that the question has been this evening and finally set right. In this respect the architectural commentator certainly has corrected the Greek scholars. Any observations upon the extraordinary sagacity, the more than ingenuity of Mr. Fergusson's illustrations would be out of place from me who am not an architect. Others will appreciate that better than I am able to do; but I may express my sense how much we are obliged to him—whether as scholars or architects—for this illustration of a most important and interesting building; a building in so many respects exceptional and

anomalous. The fact of these slanting walls is only one of the anomalies in Grecian building that are presented to us, associated as it is with different levels of apartments within and of ground-line without, and the variety of the applied proportions. There are four porticos or their equivalents, and while each is beautiful and of beautiful proportions all are differently spaced and are of different dimensions. This building, I conceive, conveys an intimation how much knowledge of the resources and capabilities of pure Greek architecture is unhappily lost; for I cannot but think, when I see how much variety the Greeks introduced into a building of this class, of which the requirements were usually restricted, with the most happy effects, that they must have doubtless shown in other buildings for the purposes of civil life an equal power to adjust their architecture to utility and circumstances. It was only the other day I was reading an oration of a Greek orator, in which he severely upbraids contemporary politicians on account of the excessive luxury of their houses as contrasted with those of their predecessors. He implies that the wealth which they had acquired for that purpose had not been come by honestly—which is possible enough, but does not concern us here. But what does interest us closely is that he speaks of the simple dwellings of Pericles and Themistocles as known to all, whereas he characterises the houses of his time as accumulations of extravagance. The inference is not to be escaped, that there was a great variety of fine Greek architecture adapted to the various purposes of luxurious and highly cultivated life. We know that in the time of Alcibiades the interiors of houses were decorated with paintings in the most extravagant way; and it is related of Alcibiades himself that he made a captive of a painter, and would not release him until he had decorated the interior of his house. One could wish for the revival of that taste for interior decoration which characterised the Greeks in the time of Alcibiades, if it is too much to hope for such a chance of indulging it. I beg very cordially to join in the vote of thanks which has been proposed.

Mr. PENROSE: May I be allowed to add one word? It may not be generally known to those who have studied the subject that this comparatively small temple of Minerva Polias was the most sacred temple of Athens. Although the Parthenon was larger, it was a less sacred building. It was to this statue of Minerva that the great procession of the Panathenaic festival was directed. It was the earliest shrine in the city of Athens, and this double temple commemorated the celebrated strife between Minerva and Neptune for the ascendancy of power in the city—Minerva having produced the olive tree, and Neptune having brought forth the water.

Mr. E. HALL, Visitor: There are some peculiarities in this building which are more in conformity with Roman than with Greek architecture. First of all there are the attached columns, and then the remarkable internal pilasters. I do not myself know any other Greek temple in which pilasters were introduced; but here there are pilasters on the internal face of the western wall, which in its general characteristic is decidedly more Roman than Greek.

Mr. F. LEIGHTON, R.A., Visitor, (responding to the invitation of the President)—I need not say I am flattered by the mention of my name. As far as the architectural question goes, it would be the height of presumption for me to venture an opinion upon it. I have seen the Erechtheum at recent date, but with the eyes of a layman, and am not qualified to pronounce an opinion entitled to any weight or authority. I have been much struck with Mr Fergusson's explanation, particularly with regard to the north porch, which to my mind, announces something beyond the central door, and leads one to suppose the existence of an important building at the western end. If you would permit me, I would draw attention to a subject which concerns not exactly my own profession, but which touches me very nearly. That is to the treatment of the Koræ in the southern portico. I regret there is not a larger diagram in order that gentlemen might follow my remarks. On approaching the temple the first thing which struck me with regard to the statues, was their extraordinary monumental and columnar appearance, which effaces any unpleasant feeling one might have with regard to figures

unsupported by any framing carrying an architrave (even though the entablature is, as you know, lightened by the omission of a member;) the whole impression is that of dignity, strength, and symmetry. One would suppose at first sight, the figures were identical, except in so far as three (those to the west) stand on the right hip, and the other three on the left hip, bringing the vertical line into the angle. On approaching them however, one is struck with the prodigious variety in the details of the figures, not merely in the arrangement of the hair and the motions of the drapery, but in the angle of inclination of the heads, so that none of the figures are alike. I myself, remember three or four varieties, and from that I argue there might be five or six. Now to what does this point? There are two suppositions which we may make—either that the sculptor had six different models for his figures, which it seems difficult to imagine, or else that the sculptors of that day were so prodigiously gifted, that in marble they could work with more certainty than we even in the present day in more plastic material. Observe also what sensitiveness is here implied, not only in the artist, but in the public, to whom these subtleties were addressed. The whole thing is so eminently Greek and so little English, that I thought it not unworthy of your notice.

Mr. W. BURGESS, Fellow.—Mr. Fergusson has propounded a very bold theory, and it rather takes away our breath. We cannot decide upon a question like this when the majority of us come unprepared with any knowledge of what Mr. Fergusson was going to advance. I would therefore propose that Mr. Fergusson's paper and drawings should be published, and that we should meet in a month or six weeks and then discuss it. It is decidedly a new theory, but Mr. Fergusson has not told us all about this Temple; it is a most beautiful building, but not the most noble one to be found on the rock of Athens. We have at present only heard about the dry bones. After ascertaining the anatomy of the building, we might well have a lecture on the architecture, which would be far more interesting to us as architects. We do not want antiquities so much as art, and especially Greek art. I may even suggest that the more perfect development of 13th cent. art, viz., the French school, is very like what the Greeks might have produced if they had had to work in a different material and a different climate, with the advantage of a knowledge of the pointed arch.

Mr. J. T. WOOD, Fellow,—To my mind Mr. Fergusson has perfectly succeeded in establishing his main point, viz., that the Pandroseum was to the west of the Temple of Minerva Polias. Looking at the plan before us, it would seem to have been an afterthought, but the text of the inscription proves it to have been built at the same time. I have been asked how large the olive tree is, and whether it was likely to grow in the court shown in Mr. Fergusson's plan. It is a small tree, unless it is very old, and its branches take rather a vertical than a horizontal direction. The oblique direction of the wall of the Pandroseum might have been misunderstood, from having taken one stone only as a guide for that long length of wall. The direction might have changed at a distance of a few feet, but if I am not mistaken, Mr. Fergusson's chief anxiety is to prove his theory as to the position of the Pandroseum, and I think he has done so to our satisfaction.

Mr. ARTHUR CATES, Fellow,—Without entering on the detail of the interesting restoration which Mr. Fergusson has laid before us, and which appears to follow very closely the somewhat vague description given by Pausanias, I would invite his attention to one important point for consideration. As Mr. Penrose has told us, the Minerva Polias here worshipped was the most revered of the Minervas of Athens, and it is thought that the ancient image preserved in that temple was that image of the Virgin Goddess cut in olive wood and from Heaven descended, which was by Orestes brought from Aulis to Athens. Besides this peculiar sanctity of the image we must also look to the characteristics of the Goddess. M. Burnouf, till lately Director of the French Academy at Athens, has given much attention to the deities worshipped in the Acropolis, and to those connected with the Erechtheum; he has traced their origin to the worship of the forces of nature in operation in the locality, and has identified the

deities, heroes, and other mythical personages therewith; he has established the identity of Minerva with the Aurora, showing her to be the Virgin Goddess of Wisdom (light) sprung from the brow (not the brain) of Zeus (the eastern sky). At the Parthenon the altar was in advance of the temple to the east, where the priests saluted the first beams of the Aurora rising between the mountains. The statue of the Goddess was at the west end of the temple looking out directly to the east and approached therefrom. On Mr. Fergusson's plan he has placed the Temple of Minerva on the lower level, with the Goddess in a niche backing to the light, looking out only on the back of the western wall of the Temple of Erectheus, which he has placed in the most important and honourable position. Considering, therefore, that if M. Burnouf is right in connecting the worship of Minerva with that of the rising sun, it is hardly probable that the shrine of a deity so specially revered as Minerva Polias would have been hidden away in the manner suggested by the Restoration before us, where there would be no chance of the rays of the Aurora reaching the temple or the shrine, and it seems likely that M. Tetaz may be right in the arrangement which he has adopted of placing Minerva Polias in the eastern section of the "double house"—a position which would accord better with the presumed attributes of the Goddess than that adopted by Mr. Fergusson, who has followed, perhaps, too closely the indications of Pausanias; and this may be adopted without much disturbing the other suggestions he has offered towards the solution of this most interesting problem.

Mr. R. P. SPIERS, Associate,—May I be allowed to suggest that this subject might be taken up again at the Conference which is proposed to be held next June; I think it is one of the most important Papers ever read before the Institute. On the last occasion of the Conference the Institute seemed to be at a loss to know what subject in the art section should be treated of, and the "Queen Anne" style was the only one that offered itself. I think we might have something next time with higher principles and a better foundation. Probably Mr. Fergusson, by the time the Conference meets, would be able to say more as to the architecture and decoration of the Erechtheum, which, added to remarks from Mr. Burges upon internal decoration, would form a valuable subject for discussion.

Mr. FERGUSSON,—There is very little for me to say in reply upon the Discussion, inasmuch as there has been tolerable unanimity in assenting to the general ideas which I have brought forward, and not much difference of opinion even with regard to the minor details. My principal object has been to settle the position of the Pandroseum, and to show how the three temples were arranged relatively to one another, for until that is done it seems impossible to explain the architecture. So long as it seemed necessary to put all the three temples in the one existing building the whole was an inexplicable mystery. The first point is to get a correct plan of the building, and then the architectural details are easily explicable. [Mr. FERGUSSON replied to the observations of Mr. Watkiss Lloyd with respect to the *naos*, &c., by explanations on the drawings.] He added:—With regard to the suggestion of another paper on the Erechtheum as an object of architectural art, I should be very glad to have the subject discussed, and will readily give all the aid in my power, but to treat such a subject as it ought to be treated, would require an immensity of drawings which I am not prepared to undertake; but if anybody will do so I shall be most happy to assist in it. The great point, it appears to me, is in the first place to establish the plan, and then we shall be the better able to understand the artistic merits and architectural arrangements of the temple. My theory is that Minerva being the principal personage, to her the principal part of the temple should be assigned, and therefore I have no doubt whatever this blue coloured portion of the plan was the portion of the building devoted to that Goddess. What I have next insisted upon is that the Temple of Pandrosos was placed externally to the westward of that of Minerva, and that the remaining portion of the building to the eastward was the Temple of Erectheus. If this is agreed to, it appears to me that all the anomalies of the building disappear, and we have a sound basis on which to proceed with the work of restoration.

THE PRESIDENT.—I am sure, I need hardly put to the meeting the question whether you will pass the vote of thanks to Mr. Fergusson, which has been proposed by Professor Donaldson, and seconded by Professor Lewis, for this very interesting paper. It would, perhaps, be presumption in me to attempt to add to what has been said, further than to make one or two remarks upon force of evidence as brought to bear upon the question discussed. For though I may say it was one of my earliest lessons to draw some of the details of this building, which as you may imagine, was rather a long while ago, the evidence adduced by Mr. Fergusson in proof of the Pandroseum having been to the westward of the better known group of temples, appears to me to be very convincing; for, if the translation of that passage in the inscription be trustworthy, it speaks distinctly of certain *attached columns on a wall* as facing the Pandroseum; and whether it means that the wall or the columns faced that building matters little. If the *columns* were intended, the evidence is direct that the Pandroseum was a separate building to the westward, if, on the other hand, the *wall* were intended, it either faces in the same direction or eastward into a narrow covered space, lighted by windows, which is wholly inconsistent with its having enclosed, as the Pandroseum did, the sacred olive tree. Again, Pausanias speaks of the Erechtheum as a *double* temple, which would hardly have been applicable had *three* temples been included within its walls. It, in fact, consists of *six* parts; but in speaking of it as a *double* temple, it is clear that Pausanias throws aside the two porticos, the quasi portico supported by caryatides and the vestibule cut off by the range of pilasters. As regards the southern wall of the space to the westward of the temple, which is both oblique, and is of undue thickness compared with the other walls, the question suggests itself, whether it might not have been the wall of some structure which existed before the Persian invasion. It seems to have been in part a retaining wall, and in part to have risen above the ground towards the south. That the space which Mr. Fergusson assigns to the Pandroseum was actually occupied by a building contemplated during the construction of the Erechtheum, is proved both by the door from the northern portico and that in the west wall of the temple itself; and this is confirmed by the marks of buildings having abutted against that wall, and to where that western door was central. That the Temple of Minerva Polias occupied the western portion of the existing structure seems probable from the apparent evidences in connection with it both of the saline well and of the tomb of Erectheus, though certain difficulties, no doubt, suggest themselves in connection with this theory.

Should this Discussion be resumed, as I hope it may be, the difficulty spoken of as regards illustrations of architectural details can, I think, be got over. Some months will elapse before the meeting of the Conference takes place, and if gentlemen who have sketches of the Erechtheum or have the means of obtaining them, will bring them forward on that occasion in communication with Mr. Fergusson, an admirable collection of drawings such as is seldom brought together might be the result. I hope gentlemen will do so, because the published drawings do not show all. I do not for example, know any which shows the frieze, which is said to have consisted of reliefs in white marble upon a ground of black marble. Some fragments are said to exist, but I have seen no drawing of them.

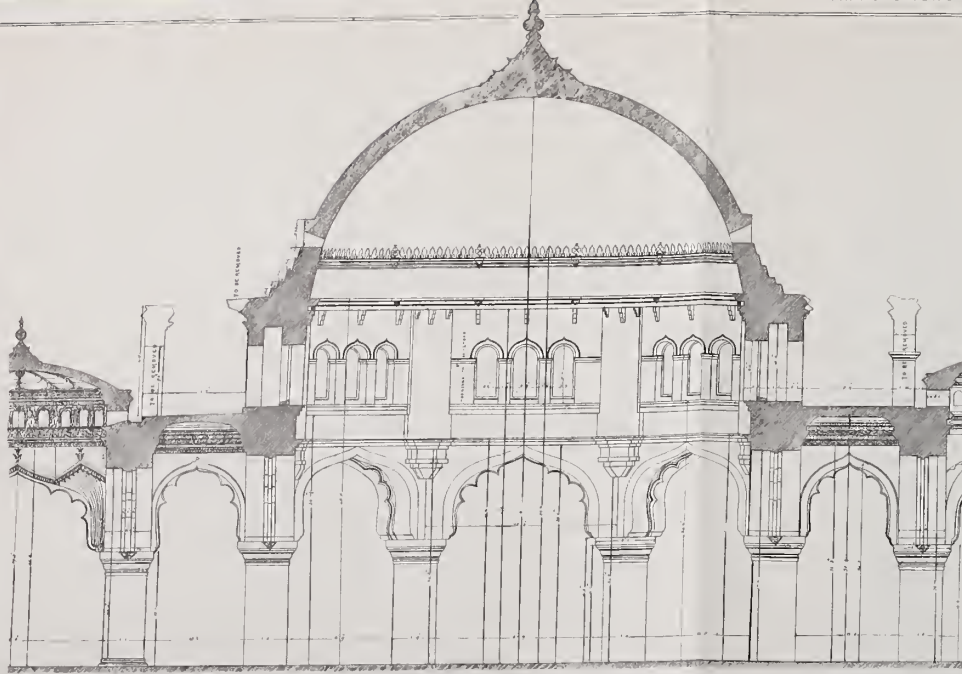
Professor DONALDSON: Nothing remains of that.

Mr. BURGESS: Some portions have been found.

THE PRESIDENT: With regard to the age of this building, it is curious that a structure so elaborate in its details should be within twenty or thirty years of the same age as the Parthenon; and if Mr. Fergusson can trace out the history of those ornamental details as having come from Oriental nations through Persia, it would be highly interesting.

The vote of thanks to Mr. FERGUSSON having been carried by acclamation, the Meeting adjourned.

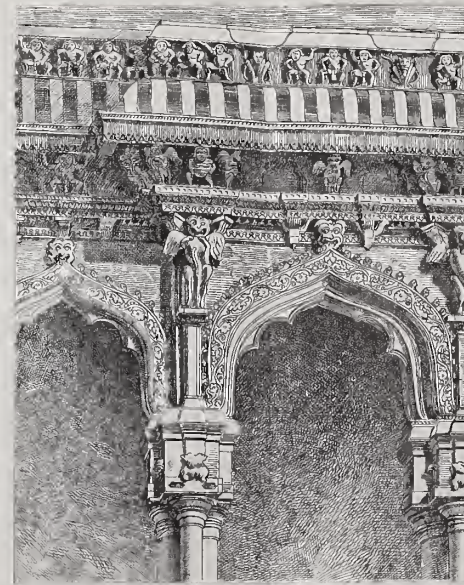
TIROOMAL NAIK'S PALACE - MADURA - INDIA
SECTIONS, ILLUSTRATING MR CHISHOLM'S PAPER.



CROSS SECTION ON LINE E. F.

SCALE OF FEET.

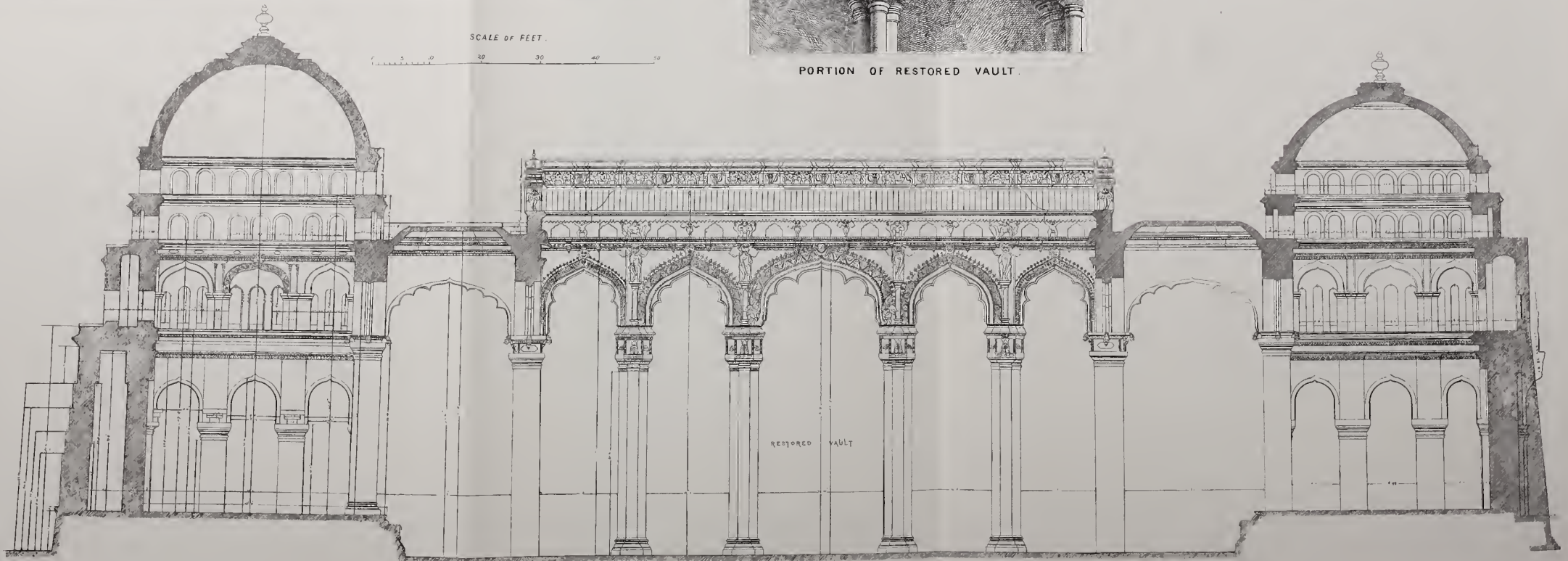
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CROSS SECTION N° 2 ON LINE C. D.

Royal Institute of British Architects,

SESSION 1875-6.

At the Ordinary General Meeting of the Institute, held on Monday the 28th of February, 1876,
SIR GILBERT SCOTT, R.A., President, in the Chair, the following Paper was read:—

TIROOMAL NAIK'S PALACE, MADURA.

By R. F. CHISHOLM, F.M.U., Fellow.

MADURA, the ancient capital of Southern India, is situated about latitude 10° north, and longitude 78° E of Greenwich, and lies distant from the more generally known town of Trichinopoly, 84 miles due south.

The foundation of the city, according to William Taylor's valuable translations of the "Stalla Puranas," is ascribed to the miraculous intervention of the God Siva, and the building of its famous Pagoda, is mixed up with the incarnation of Minatchi—the presiding goddess of the Great Sivite Temple, who was, according to the Hindoo Mythology, born from the flame of a sacrifice in the days of Malijathusen Pandion, the reigning monarch. In consequence of this admixture of fact and fable, the early history of the place is wrapt in much obscurity. Madura seems to have formed part of the Sera Desam country, which was conquered by the Soren King A.D. 894, but the earliest date to be fixed with any degree of certainty, is the Mahomedan Conquest, which took place A.D. 1324. * It was reconquered by the Pandion kings who were succeeded by the Naiks, to the greatest of whom—Tiroomal Naik—is ascribed the building of the palace, illustrated on the drawings before you.

The word Madura, or more properly "Mathurai," meaning "Pleasant," is an apt appellation in this particular case. Picturesquely situated on the banks of the river Vigay, with hills of considerable altitude on the north, fantastic rocks on the north-east and south-west, and the lofty Pulney range on the western horizon, the city possesses all those natural adjuncts which tend to give dignity to the works of man. The approach from the north is very striking. The lofty towers of the temples rising in solid pyramidal forms from the thick foliage which skirts the banks of the river, possess a singular aspect of venerable antiquity, and in the absence of familiar objects to determine their respective dimensions, impart to the beholder a rather exaggerated impression of the size and importance of the town.

Crossing the famous causeway and arriving in the interior of the city, we find it full of the most interesting and important works of public utility. Temples, tanks, public stairs, rest-houses, markets, and the royal palace of Tiroomal Naik. What enhances the value of these works is that, with the exception of the building I am about to describe, they are all wrought in the hardest gneiss, the columns and groups of sculpture being chiefly monolithic. The palace of Tiroomal Naik is built of stone and brick plastered—a fact scarcely to be regretted, when we consider that to this alone is due not only its present existence, but also its capabilities of future restorations. Had the design been carried out in stone, nothing would now remain but a mass of shapeless ruins.

It may lend additional interest to Madura to note, before passing to the subject of my paper, that the art of stone carving has not been lost by the Madura people. Additions are now being made to the Sivite Temple, and the carving differs from the old work only in respect to its newness, and although the character of the work does not demand the spirited modelling of the human figure so admirably executed in the old, I have little doubt from the character of the details I inspected, that these could be equally well reproduced should a demand arise for them. In the new work the close adhesion to the old forms is remarkable, and would in its way most thoroughly satisfy the requisitions of a Western purist. There is neither progress nor decline.

Tiroomal Naik was either the last, or the last but one resident Naik, of the line of kings descending from the Great Visvunathu Naik, and to Tiroomal are ascribed most of the civil works of Madura. He commenced his reign A.D. 1622, and the palace is said to have been finished twelve years afterwards, A.D. 1634.

Tiroomal Naik's palace is situated in the heart of the city, not far from the Great Sivite Temple, and the remains of the buildings form only a part of a very large group, portions of which can now be traced over an extensive area.

The accessible literature of the country is so meagre and unsatisfactory, that it is impossible at the present time to determine either the exact extent of the buildings, or the uses to which they were severally put. The quadrangle marked A and B, is usually called the Hall of the Dancing Girls. This misnomer has probably arisen from an inaccurate reading of an old description of the palace, supposed to have been written by a contemporary, and also to be found in Taylor's Oriental MSS. I may mention that these manuscripts were originally collected by Mr. Wheatley, a confidential employé of Governor Lushington. They fell into Mr. Taylor's hands about the year 1825. They are in the same native handwriting, and I (quote from Mr. Taylor) "do not bear the marks of remote age." Without troubling you with the whole description of the palace, much of which is now perfectly unintelligible, I will quote that part which apparently describes the Hall marked B, and the great quadrangle A. After mentioning an artificial garden, the writer says:—"To the south-west of this place is the "avenue for dancing girls. In that place the king is accustomed to sit and converse with his ministers "of state and his favourites, and in the evening flambeaux are lighted up, and female dancers exhibit "their skill before the courtiers. To the west of that avenue is a very large dome-shaped building, "in the centre of which is a square hall of black stone."

So far, it will be seen that this description tallies exactly with what might be said of the great quadrangle, but reading on further, the writer continues—"To the south of this (that is the avenue of "the dancing girls) is the Swerga Vilasam. This pavilion is so constructed as to cause it to be said, "that in no other country is there a saloon equal to it, on account of its splendid ornaments, their "excellence, number, extent, curious workmanship and great beauty. To the west, in the midst of a "great dome-shaped hall, is a square building of black stone, which includes a hall made of ivory. "In the middle of this is a jewelled throne, on which the king is accustomed to take his seat at the "Great Nava Rathiri Festival * * * To the north, the west, and the south of this throne pavilion "are three square halls."

From this description it would seem highly probable, that the Swerga Vilasam, was the great quadrangle, more especially as there are no remains of any buildings to the south of this, except at the point marked H, and this does not appear to have extended far. Assuming this to be the Swerga Vilasam, then the chamber marked C must have been the hall of the dancing girls. There is nothing in the description which will not apply down to the dome-shaped building at the west end, remains of which still exist. The only difficulty lies in the use of a word equivalent to "avenue;"

but a writer who represents a jewelled throne as in the middle of a hall made of ivory, which is included in a square building of black stone, this again being set in the midst of a dome-shaped hall, cannot be held responsible for preciseness of expression.

Further on, mention is made of an "avenue" for the combat of gladiators, with different kinds of animals, and although the points of the compass render it impossible that the great quadrangle formed this avenue, I would prefer to doubt the accuracy of the description beyond the fact, that a place for such displays existed, in which case, I consider it highly probable that the great quadrangle was actually this arena.

One of the earliest descriptions of the place I have met with, is by an English traveller dated 1795, it says :—

"The walls of the city, nearly three miles in extent, and built of stone, with a broad and deep ditch, are now quite out of repair, and could never have been deemed strong; but the remains of some of the most elegant and durable specimens of Indian architecture are to be met with in this place, particularly the ruins of Tiroomal Naik's Palace, and his thousand pillared choultry. The hand of time, and the more destructive paws of mischievous man, have in vain combined to destroy these inestimable vestiges of former science and grandeur. Whole apartments, and parts of others, particularly arched roofs, of various dimensions, composed of brick and chunam, now one inseparable mass, have withstood every wanton effort to destroy them, and in many places where such roofs have been originally supported by wooden pillars, large beams, and framework, the more perishable parts have been laboriously dug out and removed. Whilst even some few traces are still to be found of various coloured stucco, or fine chunam, with which the whole had been faced and finished."

Daniel visited India towards the close of the eighteenth century, and in his views of Hindostan will be found two fairly accurate representations of the Hall marked C. I should mention, however, that in the interior view (which has been reproduced by Mr. Fergusson in his "History of Architecture") a more decidedly Saracenic character is given to the work than it actually possesses. Although the forms are undoubtedly of this type, the ornamentation may better be described as a jumble of mixed Saracenic and Hindoo forms. In the waggon vault, lines are shown running longitudinally, which convey the idea that the vault is boarded, whereas it is all composed of brick and mortar.

Leaving for awhile the question of date, I will proceed to describe the building in greater detail. The large quadrangle which you see before you marked A and B measures, internally, 405 by 235 ft. Towards the east is an open courtyard, which originally measured 200 by 100 ft.; but by the addition of the waggon vault, represented in the perspective drawing, the dimensions of the courtyard are reduced to 160 by 100 ft. Surrounding this courtyard is a row of lofty columns, carrying a Saracenic arcade and Hindoo cornice and entablature, upwards of 60 ft. high. At the angles of this arcade, and centrally situated east and west, the roof rises into domes of a Saracenic form. Around the inner row of columns, that is between them and the external wall, are two rows of columns of a lesser altitude, rising from a platform 6 ft. above the level of the courtyard, the difference in level between the two roofs forming a kind of clerestory. On the face of this platform are the remains of a very handsomely carved stone plinth, with steps at the western end, rising to the great platform. This platform appears to have been carried all round the courtyard, and although there are elaborate preparations for an ornamental centre on the eastern external face, no entrance ever existed, and the present entrance through the wall and platform was cut through within the memory of some old inhabitants.

At the west end of this quadrangle rise three domes. The central dome is supported by twelve columns, shown on the plan, which enclose a square 64 ft. across. The twelve columns are first linked together by massive Saracenic arches; four similar arches are then turned across the corners, and the

drum rises in an octagonal form through the roof, pierced by a clerestory. Above this the octagon is brought suddenly to a round at the underside of the cornice, which forms the springing of the dome. The clerestory, already mentioned, is protected from the weather by double verandahs; the north and south sides of which are in ruins.

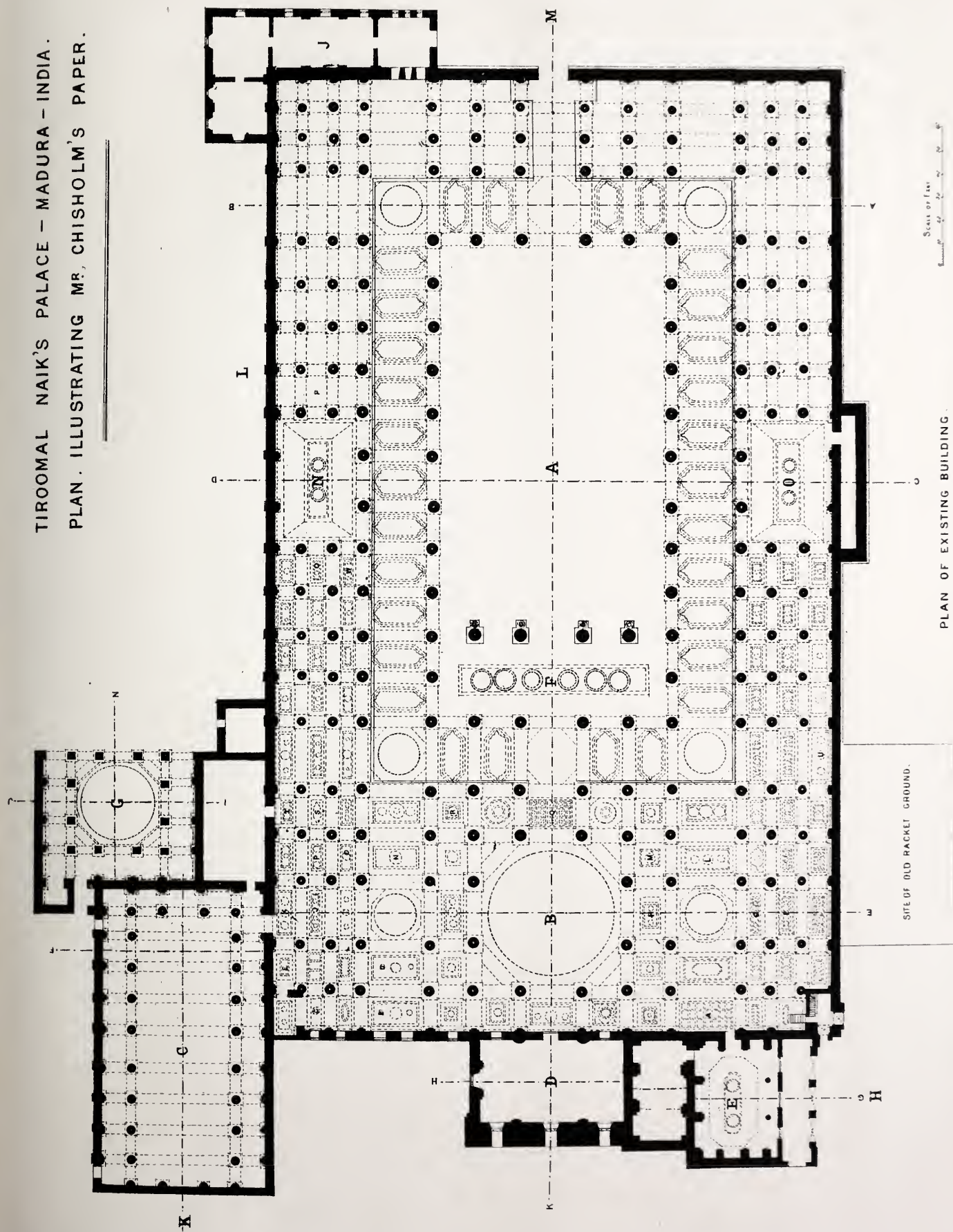
To the north and south of the great dome two smaller domes rise through the roof, square on plan, and each carried by four angle columns. In these domes the octagon is arrived at by angle arches. Turned from the haunches of the principal arches a very low clerestory rises above the roof, and a dome of low curvature, circular on plan, closes the opening.

The two oblong chambers marked N and O rise to a considerable height above the roof, and are the most faulty pieces of construction in the whole work. It will be seen from the cross sections that the portion above the roof is pierced by three tiers of windows, open to the elements, the whole surmounted by a heavy vault of brick and mortar. The walls and roof are cracked in all directions, and the southern chamber was further damaged only two years ago by lightning.

With the exception of the waggon vault at the west end of the courtyard, to be yet described, the whole of the remaining portion of the building is roofed in by domes of low curvature. Upwards of 196 columns support the superstructure. The columns are linked together longitudinally and transversely by Saracenic arches, carrying spandril walls, and so dividing the square to be roofed into small rectangular forms. The roof, therefore, presents two large flat uneven terraces, with the domes rising above them. From the way in which the inner arcade is raised to admit of the clerestory, I am led to conjecture that it was the intention of the builders at one time to roof in the whole area of the courtyard by vaults similar to that already constructed at the west end. This feature is clearly an addition, and formed no part of the original design. It occurred to me, while inspecting the wall, that the courtyard must have been, originally, six columns broad by twelve columns long, with the oblong chambers marked N and O situated centrically; and on breaking away the plaster at the back of the vault I actually came upon the bond between the old work and the new, the bricks being of a different size; and from the way in which this vault has been constructed, I am further led to conjecture that it may have been one of a series intending to cover the whole area of the courtyard. It is scarcely to be conceived that the builders imagined for a moment that the four columns could take the thrust of a heavy vault; and it appears to me that when the scheme to roof the whole was abandoned, the builders acknowledged the inadequacy of the columns to sustain the thrust by supplementing them with slender shafts supporting the additional thickness of masonry above. Had the builders intended this vault to be a permanency in the ordinary nature of things, the whole thickness of abutment would have been given at once, and not added in this makeshift way; and as I have before said, unless it was the intention to roof in the whole area the clerestory around would be meaningless. By one of those happy accidental effects, so frequent in old work, these slender shafts form one of the most pleasing features in the whole design. Their effect is fully seen in the perspective drawing.

The chamber previously mentioned as being illustrated in Fergusson, marked C on the drawing, is 125 ft. in length, and 69 ft. broad, divided in the breadth by columns, which make the spans respectively 10 ft., 41 ft., 8 ft., and 10 ft.; the hall is 56 ft. high. The columns are linked together longitudinally by Saracenic arches, and immediately above the capitals the walls are corbelled out to receive the ribs of the waggon vault. A gallery runs along either side, with arches of low curvature, divided into triplets. The vault springing immediately behind the haunches of the arches between the ribs, with three small recesses in each bay on the curve of the vault. In Daniel's time a domed chamber existed at the west side, somewhat similar to a domed chamber which now exists at the east end; but the whole fell about twenty years ago during a heavy thunderstorm.

TIROOMAL NAIK'S PALACE - MADURA - INDIA.
 PLAN. ILLUSTRATING MR. CHISHOLM'S PAPER.



The east end of this hall is the latest piece of work to be met with. It is a coarse jumble of Hindoo and Mahomedan forms, whose only merit is a certain barbarous picturesqueness.

Local tradition favours the supposition that this room was Tiroomal's bedchamber. Four holes, symmetrically placed, are pointed out as the spots where hooks existed for carrying the royal swinging cot, and a hole, sufficiently large to admit a man, is said to have been made by a daring thief, who, descending by the ropes of the swinging cot during the absence of the king, possessed himself of certain treasure, and again made his exit by the ropes. As the roof is 58 ft. over the ground, the feat would be one of great daring.

There is an odd alteration in the piers of the gallery, which it is difficult to account for. Every pier along the whole length of both sides has a piece cut out of it, and this tends greatly to weaken the whole structure. I rejected the supposition that valuable supports existed, and that these have been removed, partly because I think some indication would be left somewhere of the violent removal, and partly because it would be a most unusual thing for objects of value or interest to occupy such positions. I am inclined to think it more probable that at one time this was used as a Durbar Hall—these galleries being set apart for the use of the ladies. The whole of the gallery openings in this case would have been filled with perforated work. The piers were probably cut away to afford greater accommodation for the sightseers. This is conjecture; but worth noting as a point which might hereafter throw light on a date.

The chamber marked D measures internally 80 feet by 35 feet, and is 67 feet high. It is roofed by a brick vault turned from each wall above a small clerestory, protected by a verandah.

The west side contains three exceedingly ugly openings in a wall of enormous thickness piled up with underpinning to take the thrust of the arch.

It is worthy of remark, as bearing upon a conjecture to be noticed further on, that the only recess in the great quadrangle is at the point marked D. Opposite every column throughout this quadrangle is a square pilaster; but at the centre of the west end two round columns evidently stood clear, and the wall constructed across the western end is modern. There is great similarity both in form and detail between this chamber and the chamber marked F in the courtyard, and it seems not improbable that both were erected about the same period.

This chamber (D) leads through a small prison-like apartment into a beautiful court in excellent preservation marked E, and this, again, had a circular chamber on the south. All trace of the circular building has long since been obliterated. The chamber marked E measures internally 44 feet by 26 feet, and the whole of the south wall is supported by two magnificent columns of black stone, both of which were originally monolithic. These columns are nearly 3 feet in diameter and 18 feet high. The western one is split straight across, about twelve inches below the capital, apparently from the blow of a cannon ball. Except the actual point struck the fracture is clean and even, and the column is in no way knocked out of the perpendicular.

The chambers at the north-east angle, marked J, were added subsequently to the construction of the wall of the inner quadrangle. This is proved by the pilaster and plinth of the outer wall still existing in the interior of the rooms. In addition to these numerous buildings and chambers I have already mentioned the fact that a domical pavilion formerly existed south of the chamber marked H, and another also to the west of the chamber marked C. Along the whole of the northern side of the great quadrangle are the remains of arches proving that the palace buildings also extended in this direction, while towering over the thickly packed huts in the north-east and distant from the palace about half-a-mile, stand ten solitary columns.

Now the supposed contemporary description from which I formerly quoted, commences thus, "At the entrance of the palace on the north-east side are ten pillars," and no doubt the writer referred to these columns, hence the palace buildings must have existed over a very large area.

The materials of which the palace is constructed are rough hewn stone for the supports, and brick-work for the superstructure.

Except in the case of the three western domes, the angles of the octagonal forms, immediately under the various roofs, are obtained by building out the corners and supplementing the projected masonry with wooden supports, and on these pieces of construction a portion of the weight of the domes rests. In the larger domes a similar expedient has been adopted in working from the octagon to the round.

The waggon vaults have, in no case, been a success, and the abutment given is invariably insufficient to meet the thrust of the vault. Tiroomal Naik's bed chamber is cracked from end to end, and the apex of the roof in lowering has thrust out the north wall. The vault, marked D, has only been prevented from falling by heavy underpinning on the north and west. The addition in the courtyard which, as before explained, has nothing to resist the thrust of the vault but the superincumbent mass above the columns, must have been in the most critical position before the slender shafts were added in front of the larger columns. The removal of the two central smaller shafts which are said to have been of black polished granite, and were probably ruthlessly torn out for their value led to the failure and almost to the total destruction of the vault, which is cracked both longitudinally and transversely. Fortunately, in obeying the laws of gravity, when the thrust of the vault moved the mass for the vault split into four parts, and the tendency of the two outer quarters to turn on the exterior angles jammed the masonry together at the centre, and as the sides of the courtyard have successfully borne the strain, the vault remained poised in this manner until the restorations were commenced. In the movement forward the brickwork of the central arch was loosened, and a large portion fell.

The photograph represents the exact position of this façade before the restorations were commenced. The arcade round the courtyard is in a very ruinous and dangerous state. Most of the domes are cracked. Some of the arches have no rings, and two or three of the domes have fallen. If in 1790 the buildings were invariably described as a heap of ruins, their actual condition in 1870 may readily be imagined.

The general style of the work is a mixture of Hindoo and Saracenic art. The forms generally being Saracenic and the ornamentation Hindoo, or Hindoo interpretations of European forms. And those who are at all acquainted with this form of art will readily conceive with what profusion ornament has been lavished. As might have been expected, there is a very variable standard of excellence, both in the design of the details and in the workmanship; and, again, neither the one nor the other is in any way equal to the conceptions embodied in the collection and grouping of the various parts. Thus, ornament applied with the greatest propriety is sometimes defaced by coarse workmanship, while some forms on the most conspicuous parts of the work would be unintelligible were it not for better executed repetitions. Only one column of the whole series appears to have the original capital, and many of the figures, although well placed and boldly conceived, are simply deformities. On the other hand, certain parts of the work, notably the small dome south of the principal dome now restored, has some clean sharp work, with figures full of life and vigorous action. In the distribution of ornament the arches are accentuated with floral decorations. Winged lions, owls, and other winged creatures occupy the posts of honour, and dwarfs and demons the menial positions, where apparent supports are required.

The horizontal mouldings are sometimes based on the Hindoo leaf ornament, but more generally they consist of a Hindoo translation of Mahomedan forms. There is also, in the opinion of many acquainted with the work, an occasional infusion of Italian Renaissance to which I shall have occasion to refer further on. The enlarged sketch of the figures and foliage in the drawing is particularly worthy of note as illustrating this point. The varying excellence of the work as exemplified in the coarse character of much of the ornament can, I think, be accounted for in the following way. On the death of Aluma Khan A.D. 1752, who fought on the side of Chunda Sahib—Martima and Nabir Khan, two of his officers, formed a project, by which they were to be the ultimate gainers, of placing Vija, Cumara, Mutthu Tiroomal Naik on the Throne of Madura, and accordingly with much ceremony he was crowned—and the government for a short time was administered at Madura. As the old palace had in the meantime been despoiled of its treasures to enrich the Trichinopoly palaces, it is not improbable that it would receive a hasty and cheap renovation in plaster and color wash either at the time of the ceremony or immediately after, to raise the idea of the power of the Sovereign and so to produce the impression of permanence. As a proof that a hasty renovation actually took place long after all building operations ceased, I may mention that one of the figures in the upper cornice was damaged by a scaffolding pole and had to be removed. In knocking off the plaster, a second better proportioned and more highly finished figure was found underneath. This led me to test three or four particularly ill-proportioned figures, and about an inch beneath the surface of each one tested, I found a smaller and more perfect figure. Thus it seems to me very evident that much of the really good work was defaced. It is most unlikely that any hasty renovation took place during the reign of Tiroomal Naik or his successor, say before 1672, when the seat of the Government was removed to Trichinopoly, and from this date upwards there is no record whatever of the palace being used except as a soldiers' camp. Still the evidence of the renovation is so clear that the conclusions I have attempted to deduce seem highly probable, and if the hypothesis is tenable, much of the ornament we now see is not older than 100 years. As plaster work it is exceedingly bold in projection. The Yarlies or winged dragons, for instance, project nearly clear, and are 10 ft. high. The work when joined to the wall is strengthened by bamboo pegs, but where an arm or a leg stands clear, a core is made use of consisting of cocoa-nut fibre wound round bamboo. This core is sufficiently elastic to expand and contract without cracking the plaster.

It may not be out of place to give a brief description of this plaster work or "bulpum" as the Madras Presidency is famous for it. The first coat generally consists of three parts of river sand to two parts of shell lime laid on roughly by trowel and hand float. The second coat is composed of ground quartz sand and shell lime in equal proportions, brought to a surface by Derby floats, in the ordinary European manner. The third coat is a similar mixture, ground very fine to the consistency of cream. This is trowelled on and polished with agates. After applying the creamy mixture, the workman continually rubs the surface with the agate held in his right hand, while with the left he occasionally dusts the surface with fine dry powdered quartz contained in a small linen bag.

Mouldings are run from templates cut in soap stone, and ornamental work is finished with fine trowels. The surface thus obtained is exceedingly beautiful, and so hard that it chips like china.

The work executed in this way at the present time is scarcely so good as the old work. The workmen account for this by asserting that eggs and ground egg shells were used in the finishing coat of all the superior old work. I have tried this on a small scale without any effect at all commensurate with the increased cost. There are two causes which in my opinion fully account for the superiority of the old work. Age unquestionably hardens the materials and produces a bloom, and the introduction of the contract system on the other hand had led to scamped work.

Like most other important structures in India, both sacred and secular, the greater portion of the interior was at one time decorated polychromatically. All that remains of this decoration now is confined to those vaults which have happily escaped the obliterating purity of whitewash.

The colors used are only those readily obtainable in the district, the ochres, lamp-black, and a green probably verdigris, and blue and vermillion, imported from China. The colors are all used in the crude form, and no attempt is made to produce a tint by admixture. At the same time a certain skill highly suggestive is shown in softening the crude colors by juxtaposition. Thus a row of leaflets will be colored alternately red and green, or orange and blue, both combinations producing a grey bloom when viewed from below. Two of green and one of red, or two of red and one of green, forming tertiary tints, and the juxtaposition of blue and red, or red, yellow and blue simple secondary tints. I have restored two vaults on old models, and the effect is particularly pleasing. Gold is needed for certain points as an enrichment, and I think it not improbable that much of the green color was at one time gold leaf. I may mention here a circumstance in connection with color which perhaps deserves notice. In a good deal of the stonework of the temples the ornamentation is merely indicated on the surface, and until recently I imagined this to be unfinished work. I was told by a workman however, that these parts were intended to be painted, and that the lines served as guides for the painters. I have never had time to follow up the subject, but I think the statement probably correct.

Lavish praise has been bestowed on the innate knowledge of color possessed by Orientals, and an impression appears to exist in England that they cannot err in this mode of decoration. I am sorry to say however, that a sense of colour is now only to be found with the weavers, and that rather traditional than conscious. So far as the South of India is concerned, and indeed throughout the land, the most glaring and gaudy colors are used for exterior work. It is not an uncommon thing to see a white house with bright blue architraves and pea-green windows—and 16 or 17 years ago I remember observing on the river Hoogly near Calcutta, one of the King of Oude's houses painted blue throughout the exterior!

In Madura however, some of the most exquisite combinations of Oriental coloring are still to be found in the cloths for which it is famous. And these are doomed, alas, to perish before the cheaper piece goods of Manchester.

While I am on the subject of ornamentation, let me call your attention to the extreme beauty and flexibility of the general form of the arches. The principal line rises vertically or with a slight backward curvature until a certain point is reached when the curve commences, slowly at first, then increasing to a steady curvature, then decreasing again until it meets and reposes against its fellow from the opposite side. These lines so admirably expressive of increasing and decreasing momentum are highly suggestive of that concealment of effort which is one of the chief attributes of great art. The slight reflex curvature at the apex is often beautifully introduced—and the unpleasant effect of weakening the key stone is more than repaid to an Oriental eye by the avoidance of the hard angle and the gentle coalescence of the opposing curves. Unlike any other form of arch, the characteristic and expressive curve which bounds it can be maintained through arches of every variety of altitude and span.

Taking a wider view of the whole structure as a great work, neither the materials of which it is constructed, nor the excellence of the workmanship employed, will entitle it to rank beside the semi-sacred marble works of Upper India—and yet there is a poetical charm about it which these works do not possess. This is not a costly piece of intricate workmanship to commemorate the great or the good, but a royal palace in which kings have lived and revelled. This great pillared hall, with its open courtyard covering an unbroken area of more than two acres, has actually witnessed the barbaric splendour of the Great Tiroomal Naik, and re-echoed with the roars of wild beasts and the shouts of the approving

multitudes, or the more peaceful trumpeting of the elephants, and the chant and jangle of the Nautch girls. Whether it is that the mind instinctively depicts such scenes as these; whether it is from the effect of a tropical sun—the flood of fierce light which pours down vertically into this courtyard and reflects itself in subdued brilliance through the long pillared aisles of the interior; or whether it is that the very memories of the history itself, lend age to a building well within historical times, I am unable to say, but whatever the cause I must confess that I feel, in common with most people who visit the place, those emotional sensations usually called into existence by the contemplation of a great work.

The ruinous condition of much of the palace no doubt enhances the poetry, lending that peculiar charm when masses are just poised and no more, which Byron describes as—

“So old it seemed only not to fall”
“Yet strength was pillar'd in each massy aisle.”

and apart from all historical associations the dimensions are such as to secure one of the chief elements of grandeur. The outer wall over 400 feet in length, rises in one solid mass of unbroken walling to the height of 40 feet. The arcade which you see in the perspective drawing, measures 70 feet to the top of the cornice, and the columns surrounding the courtyard are nearly 40 feet to the tops of the capitals. Dimensions, such as these, cannot fail to impress the beholder.

I will now pass to a brief sketch of the restorations. The building was partially used by government in a state of great decay until 1869. In that year Lord Napier and Ettrick with the characteristic vigour and energy which marked his government generally—visited Madura himself, and at once recognised the importance of preserving so interesting a relic of past times. Shortly after his return to Madras, I was deputed to examine the palace and report on the state of stability, with the view to its possible restoration. The result of my report was such that Lord Napier and Ettrick laid the matter before his Council. It was viewed favorably, and as a tentative proceeding I was allowed, at my own solicitation, to restore what seemed in my opinion the most dilapidated portion of the work. The result of the measures I then took were considered so successful that shortly after was inaugurated that regular system of restoration which has been in progress since that date.

The point I commenced on was the vault at the west end of the courtyard—the condition of which I have already described. It seemed to me that the only safe method of securing this vault being by wrought iron ties, the danger to be apprehended from taking the pressure even partially off the sides of the courtyard, would be the movement of the whole mass forward. Nothing of this kind occurred however, and the operations carried out have been successful in every respect. Eight wrought-iron ties each two inches in diameter were inserted in couples at the springing of the vault above the cornice. These ties go right through the wall, and are bolted to cast iron plates at either end on the exterior. The labour of boring the necessary holes through many feet of solid brickwork, from a rude bamboo staging 60 feet over the ground, was very great, and an experienced staff of workmen sent down from Madras assisted in the operations.

After the insertion of the ties, they were screwed up every day about 3 o'clock in the afternoon (the hottest part of the day) until they were brought into full tension. The slender outer columns were then re-constructed in finely dressed stone. The upper stones having grooves for gun-metal wedges, which were knocked up from time to time until the columns took their fair share of the superincumbent weight. The cornice and the whole of the exterior and interior ornamentation were carefully restored on the old models, and the whole façade presents now the appearance shown in the perspective drawing. Encouraged by the success which attended the restoration of this portion, the municipality came forward and restored a portion for their own use, namely, the three small rooms at the end. A

public spirited body of local native merchants subscribed a sum of £500. to construct a suitable entrance to the palace in honour of Lord Napier and Ettrick, as a graceful recognition of that nobleman's service in the good work of restoration. And the Government of Madras, on condition of the whole interior being utilised for public offices, have set aside a small sum annually towards the gradual renovation of the whole structure.

Subsequently I was called upon for a complete estimate and scheme, and the result is the drawings you see before you. For want of time restoration works are shown on this drawing ; but at Madura itself there exists a drawing showing every part of the work as it is, and this will be of the greatest value to future restorers. The whole sum of money actually spent and to be spent amounts to about £ 20,000.

It must not be imagined that the expenditure of this comparatively large sum of money is to be lavished on purely artistic purposes, although numerous instances can be adduced where much larger sums of public money have been expended on pure adornments which do not serve so laudable an end to the preservation of a work of a bygone time. These restorations, on the contrary, fulfil a two-fold object, as I have before mentioned. For many years past the Judge has held court under the great dome, and formerly the Collector and some minor officers found place in different parts of the building ; but these latter were moved out from time to time, as the various parts made use of were pronounced unsafe, and in the year 1869 the Judge only remained. When the old structure is fully restored, all those officers now occupying rented buildings, will find place in the palace, and the sum total of the cost of the restorations will probably not exceed the capitalised rental which would eventually have to be paid by Government for public offices.

Of course this two-fold object cannot be obtained without damaging to a certain extent the interior architectural effect, and without destroying to a still greater extent that poetical charm which the kindly hand of time throws around the works of man ; but you may be certain that this, the part to be regretted in all works of a restorative character, has been dealt with as gently as possible.

Screens must, of course, be erected, and light must be admitted ; but the former are so placed, at Lord Napier's particular desire, that they do not materially break the long vistas of columns and arches which form the most pleasing features in the interior views. With the exception of the eight ties already alluded to, and those necessary for securing the Hall marked C, the whole of the remaining ironwork will be concealed from view. I may mention that these ties are nearly all inserted.

At present, owing to the transfer of Colonel Roberts, R.E., who took a lively interest in the work, and my own absence on sick-leave, the work is practically at a stand-still, and will probably remain so until my return to India at the close of the year.

With regard to the history of the buildings, as I have before stated, they are all attributed to Tiroomal Naik, whose reign of 40 years terminated A.D. 1662. They are said to have been finished twelve years after Tiroomal came to the throne. Mr. Fergusson, I observe, attributes them to Tiroomal Naik and his successors ; but adds that without seeing them it would be impossible for him to fix the exact date. The appearance of the buildings fully justifies the conclusions arrived at by Mr. Fergusson.

Apart from the comparatively recent rapid renovation, to which I have already alluded as in all probability executed at the time Mutthu Cummura Tiroomal Naik was crowned, there are evidences of three distinct periods of construction. The earlier type, which comprises the principal courtyard and roofed area around it. A second period, comprising the waggon vaults and the inner row of columns round the courtyard ; and a still later period, in which the arches are shaped as in

figure 2, and the columns invariably square. It is as if a Norman cloister had been finished and added to in the thirteenth century, and hurriedly patched up in the fifteenth. The two later types of work in the palace are to be found in Tanjore, and, indeed, in all the civil buildings in the south of India; but the nucleus of this palace, the great quadrangle around which the others are grouped, is of a totally different character to the more recent work; and it is a curious fact that this older portion, when stripped of the additions and alterations, resembles in a remarkable degree the form of a Mahomedan mosque. I have before mentioned that the only break in the wall is indicated at the western end by the two semi-round columns; and this fact gains significance when we consider that it is correctly placed with reference to the Moulavie's position in a Mahomedan mosque.

It seems to me that in determining the date of this building, apart from the ornamentation about which there can be little doubt, we have two alternatives: first, to accept Mr. Fergusson's conclusions that Tiroomal Naik commenced the work, and his successors finished it; or, secondly, that the heavier portion was partially raised before Tiroomal's reign, and that he finished it. There is, of course, a third supposition, that it was begun, finished, and added to on successive occasions, and left in its present state during the reign of Tiroomal Naik. I think, however, that this last supposition, although the only one coinciding with the historical records, may be put aside. It is scarcely possible that a monarch, actively engaged on the most extensive building operations of a semi-sacred character, could have found time and labour sufficient for so great a work; nor is it likely that the skill and knowledge of the workmen would have differed so greatly in one reign. In the older work the columns are duly proportioned to the several weights they have to bear; in the new, all descriptions of defective construction are practised; and at the western end two small turrets are raised on the roof itself, without any consideration being paid to the supports below.

The buildings themselves bear evidences of having been built by Tiroomal Naik and his successors, but if we accept this statement as accurate, we must reject the modicum of history which has been handed down to us, and read the past history of the district solely by its architectural remains; for not only does the historian from whom I have already quoted describe the buildings finished in their entirety during Tiroomal's reign, but the translation of the Pandion Chronicle in the Taylor Manuscripts shows pretty clearly that no succeeding monarch reigned in Madura, unless it was the immediate successor of Tiroomal Naik, Mutha Virapir Naik, and he reigned only 10 years. I have been unable to find out the exact date when the Government was moved to Trichinopoly, as the Naik's residence is always spoken of as the palace whether at Trichinopoly or Madura; but it was undoubtedly at Tanjore where Rustam Khan revolted.

This Mahomedan youth was the favourite of Choka Natha Naiker, the second in succession from Tiroomal Naik, and when he treasonably confined the king and assumed power, we read that Kilaven Seetâputhi by forced marches night and day arrived at Trichinopoly and besieged the town. This shows clearly that whenever the fort or the mahal are mentioned, the fort and mahal of Trichinopoly are indicated—not those of Madura; and we may be certain that the moment the Government removed to Trichinopoly the spoliation of the old palace commenced, and every polished column and other valuable would be, no doubt, transported there. In spite of the historical inaccuracy, I think, on mature consideration, the buildings themselves tell their own tale of seventeenth and eighteenth century work. At the same time there are some curious considerations which are sufficiently interesting to note, in connection with the second hypothesis, that Tiroomal Naik built on a nucleus already in existence. In the first place it is by no means impossible for the Mahomedans to have

founded a mosque in Madura. They invaded the country in 1324, and held it for 48 years until A.D. 1372.

When I ventured to make such a suggestion I was met on all sides by contradictions ; and so much jealousy exists between the two sects that history strained through the Hindoo community would be silent on the subject, even if the Mahomedans actually commenced the work. They represent the Mahomedans as a riotous, bloodthirsty rabble of soldiers, but the only act of Vandalism mentioned—the destruction of the ornaments of the sacred edifices—proves them to have been zealots ; and surely 48 years of zeal is a sufficient time for it to assume a practical form. The Hindoos, although so jealous of crediting the Mahomedans with any good work, have never paid the least respect to this fine old building, and, until the Government took it in hand, they expressed no sympathy for it.

Tiroomal Naiks Choultry contains a statue of the great Naik and his five wives. In the leg of the principal wife there is a hole which natives account for in the following manner :—This particular wife happened to be a Tanjore princess ; and Tiroomal, in his letters to her, always dwelt on the magnificence of his palace, which she on her part expressed the greatest desire to see. After her betrothal she permitted herself, at Tiroomal's request, to be conveyed into the palace blindfold, in order that its full magnificence might burst upon her suddenly. When she stepped out of her palanquin she said : “ This a palace—why its exactly like my father's stables.” Tiroomal was so enraged and disappointed that, drawing a dagger, he struck at her, and she rushed away as Tiroomal, over-balancing himself by the force of the blow, pierced her leg with the dagger while in the act of falling, and the sculptor has depicted the wound.

The anecdote is worth mentioning only as showing how readily the Hindoos seize and remember anything tending to discourage this style of art.

Assuming that the Mahomedans had nothing to do with the palace, we are then left in this position. That a Hindoo raja, thoroughly orthodox, as the great works of the tank and the teppacolum prove him to be, selected as the most suitable form for a palace, a form of building closely resembling a Mahomedan Mosque. This form being furthermore so manifestly unsuited to the requirements, that extensive alterations and additions had to be made before the buildings became habitable.

Some of the mouldings and ornamentations bear evidences of Western ideas, so much so, that for a long time the whole work was attributed to the Jesuits. You will observe, that angels stand on either side of the large central arch, and the figures and foliage before mentioned, are Italian in feeling. It was reported to government that heads and hands in purgatory were sculptured on the walls. This, I think, a mistake ; one or two corbels consist of figures supporting foliage—only the head and hands are shown, but the hands clearly belong to the head, and the writhing forms are not flames, but the Hindoo's usual imitation of foliage based on classical models. Although I believe no part of the constructive building to have been influenced by Western ideas, I must admit, that the later superficial work, especially the ornamentation on the waggon vault may have been executed under some such influence. And this is rendered more probable from the fact, that contemporary with Tiroomal Naik, and in frequent correspondence with his court, lived one of the most successful apostles who ever set foot on the shores of India. I allude to Robert de Nobilis. This remarkable man undertook the task of converting the Hindoos to Christianity with one fixed idea, consistently maintained through a mission which lasted for upwards of thirty-five years. His argument was that as the Saviour became man to save men, he would become an Indian to save Indians. He clothed himself like a Hindoo, was waited upon by Brahmins, and gave out that he was actually a Brahmin from

the West. He passed the earlier part of his Missionary life in profound meditation and study, charmed his hearers with the purity with which he spoke Tamil, and showed in argument a perfect knowledge of their most secret books. His success was as remarkable as his methods were peculiar: he suffered many persecutions for the sake of the Heathen, became at one period a victim to the severest ecclesiastical censures, but died at last a holy and ascetic recluse venerated by all.

Tiroomal Naik himself, was so friendly towards Robert de Nobilis, that Tiroomal's death in one legend is said to have been brought about by the Brahmins, from their fear that through the influence of Robert de Nobilis, he would become a Christian. It is, therefore, highly probable that one possessing so much authority, so versed in general knowledge, and belonging to an order which made every art and science instrumental to the acquisition of its desires, should occasionally have given his advice or the assistance of his subordinates, during the construction of what might almost be termed his patron's palace. At the same time, no mention whatever is made of anything of the kind in the voluminous correspondence of that period published by the Madura Mission, neither is there the slightest trace of European interference in the contemporary works of the Teppacolum and the Choultry.

I must in conclusion, apologise for many imperfections in this Paper, and in the drawings themselves, which will of course bear unfavourable comparison with the class of work usually exhibited on these walls. At the same time, I have tested and found correct several of the measurements, and I believe them to be generally accurate and trustworthy. Madura is situated three days' journey from my head-quarters, and it is not without many weary days of jolting in bullock bandies and vexation of spirit, that I have been enabled to achieve what you see before you.

I have been much honoured and gratified by the opportunity which has been granted me of adding my mite of enquiry and information to the more important researches and records, which are periodically communicated to this Institute. It is not often that the Indian Architect is cheered by the presence or commendation of fellow labourers in the æsthetic departments of his art. He is frequently surrounded by much that is beautiful or ancient, by what has been touched by the hand of extinct munificence and forgotten genius. But his field is remote, his work is solitary, his companions are uncongenial, the means at his disposal are some petty savings, after the road, the railway, the barrack and the river have been supplied: the objects of contemporary utility exhaust his energies: he has not a moment or an effort left for the worship of the ideal, for the pursuit of unprescribed and to a great extent unremunerated aims. We do not, however, decline the attempt, and I trust that what I have this evening submitted to your attention, may be accepted as a proof, that by the service to which I belong, despite many discouragements, there is still something done to place the achievements of the past in a worthy light, and to contend against the aggressions of time, which nowhere wields such formidable instruments of ruin, as it does in India.

LORD NAPIER AND ETTRICK (responding to the President's invitation to commence the discussion) said,—I must apologise for offering any remarks upon this subject after the very eloquent and instructive lecture you have already heard. It would be needless to endeavour to convince an audience like that which I have the honour to address that it is our duty and our interest in India to contribute according to our means to perpetuate and preserve the ancient monuments of the country. It would in the first place be an ungracious thing on the part of the British Government, coming to India with such great resources and such a vast amount of knowledge with reference to art, to allow monuments of ancient munificence and great beauty to go to decay. The love of what is ancient, and beautiful

and constructive, obliges us as a matter of honour and duty to the whole world, and also as a matter of trust committed to our hands, to preserve these objects of the past : but no doubt it is in a certain sense a matter of policy to do so. When we consider that the British government in India has superseded to a great extent the native dynasties of the country, and deprived them of almost all substantial power, and a great deal of what is congenial and agreeable to the national feeling, the least we can do is to preserve as far as possible these crumbling monuments of the past, with which their affections and historical recollections are so closely interwoven. In preserving the monuments of the past in India we can do something pleasing to the native mind. There are, of course, great difficulties in this work, of which the principal has been this—that the most interesting and valuable of these monuments are of a sacred character. The sacred structures or establishments in the south of India, except those of very remote antiquity, have considerable revenues, and these revenues have been in a great measure preserved by the Government, by whom they were administered for a considerable length of time. But then there came a burst of Christian zeal with reference to India. The Government were reproached with being the stewards of an idolatrous system of religion, and the administrators of the revenues which were appropriated to the support of that system. The result of this has been that the British Government, ever thoughtful and always desirous to be just and generous, has given back the whole of the revenues of the temples and mosques into native hands, and there have been constituted throughout the south of India, and in other parts certain local committees of native gentlemen to administer these revenues, and this they would appear to have done chiefly for their own physical benefit and indulgence. There has, indeed, been no genuine interest displayed in the preservation of their ancient monuments. The tendency manifested has been rather towards the construction of new works than the preservation of old ones. I doubt whether it has ever entered into the minds of Orientals—certainly not of Hindoos—that it is a commendable duty to preserve the works of other men's hands—to preserve the monuments of the past. They devote themselves, when they are moved in this direction, by preference to the erection of new buildings for similar objects, but of course, in these times, of a very inferior description. I say the first difficulty we had to contend with in regard to the preservation of ancient monuments in India was that which arose from the feeling in this country that a Christian government ought not to be allowed to be the depositories and stewards of idolatrous revenues, and this led them to give them up to the hands of native administrators, and these native administrators do not use the money well. Inasmuch then as the Government gave up the administration of the revenues appropriated to the sacred monuments, they were thrown back upon the secular structures, and of secular structures there are very few in the south of India. I do not think there are more than about half-a-dozen secular monuments in a tolerable condition of preservation, which could be used for any modern administrative purposes, and those are much neglected. The truth is, the resources which the Government have been able to appropriate to public works have been expended upon works of public utility, such as roads, tanks, river navigation, and railways. We have, therefore, done very little for the preservation of the ancient architecture of the country ; and I think it must be allowed, even if the Government had been disposed to expend more for this purpose, the class of officers whom the Government had at their disposal was not very well fitted either to appreciate or restore those monuments. The public works of India up to this time have been in the hands, for the most part, of officers of the Royal Engineers, than whom there does not exist a more devoted body of officers in the world—men of great ability and efficiency within their legitimate and proper sphere of duty, but who really have not had that amount of art cultivation which is necessary to enable them to appreciate these works. Now, then, seeing it was impossible for us to repair the sacred buildings, and that there were very few secular monuments left, it occurred to me to select one of the latter, and endeavour to place it

on the road to restoration, and it was then that fortune happily delivered into my hands the eminent gentleman who has addressed you to-night, whose name ought for ever to be associated with that of the sovereign Tiroomal Naik—they ought never to be divided. The building, which I think was happily selected, is one of the most important in the south of India, as you have heard, and we were not deceived with regard to the amount of interest attaching to it. Mr. Chisholm has pointed out that the structure is a very ancient one, and that its architecture partakes of three styles, viz., Saracenic, Hindoo, and European. Even in this particular mixed order of architecture, which prevails over a great portion of India, it is not, in some respects, a delicate or beautiful example. It is not so substantial or so elegant as the monuments of the Mogul Emperors in the north. There is almost no precious material about it, no curious sculpture, no tessellated marbles, nothing of the refinement which attaches to some of the contemporaneous structures. It is rather a rude, coarse building of stone, brick, and plaster; but it does possess one or two striking features of interest. First of all it greatly exceeds in dimensions most of the Mussulman and Hindoo buildings. I believe it exceeds in dimensions the largest structures in the north of India, and although it is not fine in execution it is on the whole very impressive, and, as Mr. Chisholm has pointed out, it affords some very interesting examples of colouring, although but slender traces of these remain. Previous to Mr. Chisholm entering upon the task of the exploration of this building, it was, I believe, assumed that the whole group was the work of the single sovereign Tiroomal Naik. Mr. Chisholm was the first to discover the succession of styles. He has pointed out that there was originally a pillared court yard, of a style essentially different from that of the façade which now meets the eye. These heavy pillars and arcades are probably two or three centuries earlier than the more graceful columns which border the present open court. Mr. Chisholm was the first to establish this, not only with reference to style, but also by laying bare the mechanical junction or union between the old work and the more recent. It seems to me extremely probable that this structure was originally commenced under a Mussulman's dynasty, which reigned for half a century, and was intended for a mosque. If it were not so it may be asked—Where is the mosque which they built? It is impossible to suppose a Mussulman government would have been established there without the building of a mosque. The Mussulmans never settled in any country, or founded any dynasty without leaving traces of architecture in connection with their religion, and therefore I ask, if this was not a Mussulman mosque, Where is it? Then again, if these buildings are of different periods, it seems to be a reasonable assumption that some portions were built after the time of Tiroomal Naik; at the same time I am of opinion that no considerable portion of the building could have been erected after his time. The line of Tiroomal Naik was removed elsewhere, the country was impoverished and distracted by civil wars, and they had neither the means nor the time to raise any large structures. Another argument may be adduced as a proof that the older portions of the palace were anterior to the age of Tiroomal Naik. In the ornamentation of the older portions there is not the slightest trace to be found of the Jesuit style of the Italian renaissance. The traces of Italian renaissance are met with entirely in the second and third periods of the building, and not in the earlier.

I think the Christian characteristics of the structure may be attributed to the period of Tiroomal Naik; nor am I aware that in the earlier portions there have been found any large figures or imitations of living creatures. I therefore assume that portion to be of Mussulman origin, for it is difficult to find in the south of India any considerable Hindoo structure in which there is not an immense number of imitations of real or fabulous animals.

We then come to the third suggestion, which is an interesting one, viz., that the large court yard, the dimensions of which were 100 feet wide by 156 feet long, was intended to be covered over.

I think it is quite certain it was not intended to be covered in by a single vault, because there is no example of Hindoos ever carrying a single arch over a span of that width. Mr. Chisholm says it was probably intended to be divided into two or three compartments, each covered by a waggon vault. There are, no doubt, appearances in the construction which might seem to countenance that hypothesis. For my own part, however, I am rather inclined to think there was always an intention to leave an open court in that portion. I do not find, in any domestic oriental structures I am acquainted with, the whole space covered by roofs. Indeed, the pillared open court yard is the familiar type of all Hindoo structures; and you cannot go into any national house of any pretensions in India without finding the open pillared court. It is the general characteristic and genius of oriental dwellings, and it would be strange if this palace were an exception to that rule, and that it should possess no open court. I feel that I ought to apologise for having occupied your attention so long. I can only say further that the exhibition of these drawings has recalled to my mind some of the most agreeable and interesting moments of my oriental life. I never expected to see this building look so well as it does on the drawings on the wall, and I trust Mr. Chisholm may live to advance in a great measure, and if possible to complete the great work which he has taken in hand.

Mr. W. H. WHITE, Fellow, in reply to the President's invitation, said,—I regret that I have only seen Madras from the road, and one cannot know much about it from that. I think we owe some apology to Mr. Chisholm for the state of the room to-night, but he is no doubt aware that when an Indian question is brought before Parliament, there are scarcely any members present. I don't know whether that will form an excuse for the limited attendance of members to-night.

The PRESIDENT expressed his regret that Mr. Fergusson was not present, as that gentleman's large knowledge of Indian architecture would, no doubt, have enabled him to bring before the meeting many points of interest in relation to this structure.

The SECRETARY said he fully expected that Mr. Fergusson, who had made a close examination Mr. Chisholm's drawings that morning, would have attended the Meeting.

Mr. CHISHOLM (in reply to inquiries by Mr. Wyatt Papworth, Mr. Arthur Cates, and Mr. Phené Spiers), stated the dimensions of the domes, and explained upon the drawings various structural details of the cupolas as well the peculiarities of the roofing.

Mr. T. MORRIS, Associate,—It would be difficult to exaggerate the obligations we are under to Mr. Chisholm for the pleasure which his admirable Paper has afforded us. He has not only given us a review of a most interesting building, but he has done it in a very admirable manner; and so far from any apology being needed for the way in which he has illustrated the subject, I (a pretty constant attendant here), can say this is one of the rare occasions on which I really feel proud to compliment the author on the manner in which he has illustrated his Paper. While viewing the drawings previous to the Meeting I was struck with the resemblance of some portions of this edifice to many European buildings; and I think it is in accordance with Mr. Chisholm's views to come to the conclusion that whoever directed the building of this edifice must either have sent an architect to study European works, or have obtained information as to their nature, or employed European artists. So far as parts of the building are concerned they remind us of Byzantine examples, and the mosque of St. Sophia. The domes are all strictly European, and the arcades have very much of the character of Norman work, more especially in the south of Europe, as in Sicily, &c. But perhaps the most remarkable circumstance is the combination of minute and elaborate details belonging to a late period with general features of much earlier character. The ground work seems absolute Romanesque, while the ornamentation is allied in intricacy to Eliza-

bethan work in this country, which is in some degree analogous to the surface decoration of many Indian structures. I beg to express great obligations to Mr. Chisholm for this excellent Paper.*

Mr. A. PAYNE, Associate, having remarked that some of the domes, in the absence of further information about them, appeared to be structural miracles, Mr. Chisholm, by reference to the drawings, pointed out some of the constructural features of those and other portions of the buildings.

Mr. ARTHUR CATES, Fellow.—When a gentleman has given so much information as Mr. Chisholm has done, it may seem unreasonable to ask him to give more, but I think those members who unfortunately are not present, and have not had the advantage of hearing his explanations, would be much gratified if he would kindly add as a supplement to his Paper—and from the questions which have been put to him he will be able to do that very readily—a short account of the manner in which these cupolas are constructed; and as I presume some portions of his drawings will be published as illustrations to his Paper it would be desirable if he would add to those illustrations plans and sections of the larger cupolas and their abutments with notes in explanation of their construction, which will be of exceedingly great interest to the profession in this country, and tend to raise our estimation of the constructive abilities of our fellow subjects in India. I hope in this I am not asking too much.

This Paper is one of peculiar interest, and if time permitted we might have an interesting Discussion upon it; it has a curious relation to two Papers recently read in this room, viz.: that which we heard from Mr. Fergusson at the last Meeting, when he attempted to restore the respective appropriations of the different sections of a building, from the descriptions of a writer who had visited it, whilst in the present case Mr. Chisholm has read quotations from a contemporaneous writer, describing in detail the buildings under consideration, but in which he is not able to allocate the apartments in accordance with the description given by that writer. We have also our old friend “stucco” turning up again. On the first evening of the Session on the occasion of Mr. Pullan’s paper, stucco assumed a prominent place, and if we go back to so early a period as the erection of the temples, &c., at Agrigentum (Girgenti) in Sicily, we find those grand Greek Doric temples—entirely finished in stucco—built of rough, coarse, and porous stone. The entire architectural detail was executed in stucco—of the finest description certainly—but as completely stucco as was the Colosseum in Regent’s Park; even the Atlantes of the Temple of the Jupiter Olympius were probably finished in stucco. And now we have here—in the Far East—and in point of time distant from the Greek works some 16 centuries or more, a magnificent work built with brick and also finished with stucco. Therefore, we may, I think give to “stucco” a little more credit than we have been in the habit of doing; it has been abused not only in words but in use. We have a material in use among us which we call stucco, but it is very different indeed from that of Agrigentum or Madura. In both cases it would seem that an attempt was made to produce fine polished surfaces by the use of the finest materials and by continued manipulation, using in fact what the housewife calls plenty of “elbow grease.” That, no doubt, was the method which the Greeks adopted, manipulating with great care a choice and fine material, and producing a surface as nearly like marble as it is possible for a factitious material to approach a natural one. Perhaps Mr. Chisholm

* I omitted to say how well the open court or impluvium appeared to suit the general plan. In a palace encompassed by lofty solid walls, an uncovered space in the midst of its high and ornamental vaultings, cooled by fountains dressed with flowers and enriched with sculpture, must have been a most agreeable and elegant feature, for which the motive no longer exists, but which may be usefully considered in any scheme of faithful and intelligent restoration.

could give us some information with regard to the manner in which the stucco at Madura is manipulated. At this late hour of the evening it would not be possible for us to enter into the question of the possible Mahometan origin of the outer arcades around the court of this building, or the Hindoo character of the larger arches. That is a subject which could be entered upon only after careful study of the beautiful drawings of Mr. Chisholm. It has been suggested by Lord Napier whether these heavy columns of the arcades do not represent the sterner characteristics of Mussulman architecture, whilst the smaller piers represent the more refined work of the Hindoo style ; and if the characteristics of the ornamentation vary so much as they appear to do, and if there are no representations of animals and figures upon the outer architecture, it would be a strong testimony in favour of that idea ; but whether this work was the production of one period or of different periods, the effect must have been most magnificent ; and it is much to be regretted that the exigencies of the public service have led to the appropriation of portions of the building for offices, &c., probably destroying the vistas, which must have been very striking in effect. There are many present who probably recollect the exhibition at South Kensington of a collection of very splendid photographs of buildings in Southern India. The subjects were of the finest description, and most interesting in the history of architecture, and the photographs were equal to the subjects themselves. If these photographs still exist I think it is most desirable that, if possible, we should possess a copy of them in our library. I would suggest that the Secretary should be good enough to endeavour to ascertain how they may be procurable. If they have been made under the directions of the Council of State for India, I imagine they would be willing to follow out the intention with those photographs were made, and would gladly deposit a series or selection of them in the library of this Institute, where they would remain for reference by the profession, and be exceedingly valuable. I hope, Sir Gilbert, some enquiry will be made on that subject, in order that we may, if possible, obtain a set of these photographs for our library. We have hitherto been so much attracted by the interesting paper of Mr. Chisholm, and the not less interesting and valuable remarks of Lord Napier, that we have forgotten the most important duty of expressing our acknowledgments, and very cordial I am sure they will be, for the eloquent and most interesting Paper with which Mr. Chisholm has favoured us ; and if I may be allowed to include in that a warm acknowledgment to Lord Napier for the admirable address with which he has honoured us, it will have the hearty support of this meeting.

The PRESIDENT.—It was my intention to have proposed that motion myself ; but I will now second it, and that most heartily, including of course that additional vote of thanks which is so largely due to Lord Napier and Ettrick for the admirable address he has given us.

I wish I knew enough of Indian architecture to be able to say anything about it which was worth your hearing. What Mr. Morris says about the peculiarly European look of some parts of this structure is, I think, due to two circumstances, or rather, perhaps, to two elements—the Mahomedan and the late *Italian*. The Mahomedan, having descended from the Byzantine—the same source, in a great degree, as our own Gothic architecture—would give the impression of an European character : whilst the finish to the later parts, by the introduction of Italian artists, would give still more of European character to the details : the latter perhaps detracting not a little from the interest of the structure. I am, however, going to be bold enough to make a suggestion upon a subject of which I am ignorant. I think, from what occurs to me respecting the general aspect of the ground-plan, the general idea that the building was founded as a mosque is a reasonable one ; but I cannot think the whole of that space was meant to be left open which includes the grey-coloured court in the middle, and the corridor (tinted pink) surrounding it. I am inclined to the opinion that this great corridor must have been intended from the first. It might have been omitted, or might have fallen to ruin, and have been

reconstructed by this king, whose name I will not venture to pronounce. My reason for thinking it was originally intended is this: where it impinges upon the older portions (the blue), there is a wider intercolumniation left for its intersection on each side of the corner of the court, and that suggests and seems to call for the construction of the great corridor coloured pink. Although the details of the front of that corridor and the arcades are of a later kind than those which are behind that corridor, I cannot but think it was part of the original intention. I am, however, inclined to think otherwise of that vaulted chamber marked F' on the plan, because it is not only not suggested by anything I see, but it destroys the uniformity of the court A. Its wide opening would have given an equal number of bays on either side of the larger central bay, whereas it now has three on one side and two on the other. I should be inclined to doubt the intention of bays like those in F' being intended ever to cover the whole of that Court A. If that were the intention, there would have been a much wider one in the centre. It seems to me more probable that the corridor has been restored according to the first intention, and then to make the chambers suitable for palatial uses, they added that one F', destroying, by so doing, the uniformity of the court.*

With regard to Indian buildings in general, it would be a great benefit conferred upon the profession if this system which Mr. Chisholm has adopted were more carried out—that is, of delineating these grand remains before they fall into hopeless ruin. I hope this will be taken up by the Anglo-Indian Government, and followed out at the public expense. I agree with what Mr. Cates says about the photographs he referred to. I have seen some—I think in this room—exhibited by Mr. Fergusson, and very magnificent they were. No one could furnish us with better information than Mr. Fergusson could do, and I hope he will help us to procure copies of them. With regard to the question of restoration of these buildings there may be difference of opinion. Mr. Ruskin would say,—Let them perish, rather than one stone be restored: If these structures are to be treated as we have been in the habit of seeing in England and France, I should be inclined to agree with him; but the only way of handing down to future generations these perishing remains is by restoration, provided it is carried out upon that judicious system which, I gather from Mr. Chisholm, has been acted on in respect of this building. That system I define to be doing no more than is necessary to render the building secure and permanent, and to render its forms intelligible without renewing one fragment which can possibly be left of the original work. I beg to convey our most hearty thanks to Mr. Chisholm and to Lord Napier and Ettrick.

LORD NAPIER AND ETTICK.—I beg to acknowledge the compliment you have paid me, and I will venture to give a little information which I am in possession of with respect to the photographs. The photographs to which the speaker alluded are, I imagine, a series which were executed by order of the Madras Government about six years ago by Captain Lyons, and several copies of the series were deposited with the Government, and there is one series I believe in the possession of the India Office. I suppose Captain Lyons could furnish examples of all the photographs, or at least of the principal ones. If I might be allowed to ask a question of those here—I would ask them to tell me whether there is any style of art, or any example that they are acquainted with of small pillars, such as these detached pillars, being placed in front of large columns; and if there is any such example, whether it may be regarded as a specimen of decorative style; or whether, if exceptional, it was probably done to provide against a mechanical danger: I would ask, does any one know an example of little single pillars placed in front of large ones?

* It is fair to say that an examination of the *section* does not seem to corroborate this idea, as the inner columns have their bases at a far lower level, and their capitals far higher than those of the outer arcades.

The PRESIDENT.—I should think not as a matter of taste merely. It would, according to my view, indicate insufficient provision against the thrust, or that it was not sufficient to bear the burden brought upon it. I do not think in this case it proves that they intended to continue the series.

Mr. R. P. SPIERS, Associate.—I think there are some instances in the South of Italy.

LORD NAPIER AND ETTRICK.—I have no doubt the photographs referred to were taken from Captain Lyons' series.

The SECRETARY.—Mr. Fergusson presented to the Institute some photographs of Indian Architecture which are now in the Library. Unless I am mistaken they form part of the collection referred to.

The PRESIDENT.—They referred to Hindoo architecture only.

The SECRETARY.—Perhaps we may venture to hope for Lord Napier's interest in assisting us to procure a set of the photographs.

LORD NAPIER AND ETTRICK.—I shall be happy to do what I can.

Mr. CHISHOLM, expressing the gratification which the reception of his Paper had afforded him, said: With regard to *chunam*, there is no great secret about it, the excellence being due entirely to manipulation. On one occasion I had to decorate Government House at Calcutta with *chunam*, and I sent men and materials there from Madras. The men sent me word that with the exception of quartz sand, they had better materials in Calcutta than we had in Madras. I asked one of the Bengal officers subsequently how they got on with this kind of work at Calcutta. He replied they could never get the same degree of excellence of workmanship. I then made inquiries from the men who went to Calcutta, and asked whether they showed the Calcutta men properly how to do it. They replied yes; but they did not tell them everything. I asked them what they did not tell them. They replied, "Not working hard enough": meaning, that all depended on "elbow grease!"

Mr. WYATT PAPWORTH.—There can be no doubt that the strength of the *chunam* adds greatly to the merits of this structure; and if we could get builders to use sand instead of garden mould, we should have considerable improvement in stucco work in this country.

The PRESIDENT.—No doubt it is better than the powdered white marble mentioned by Vitruvius, and being siliceous, it would add to the strength of the mortar no doubt. The stucco found at Pompeii retains a good deal of its original polish, and I imagine the Greek stucco was used because of the roughness of the stones.

The Discussion then terminated (a hearty vote of thanks having been previously passed to Mr. Chisholm for his Paper and to Lord Napier for his remarks) and the Meeting adjourned.

Royal Institute of British Architects.

At the Ordinary General Meeting of the Institute, held on Monday, the 10th April, 1876,
Sir GILBERT SCOTT, R.A., President, in the Chair, the following Paper was read:—

CONCRETE AS A BUILDING MATERIAL.

By ALEXANDER PAYNE, Associate.

MR. PRESIDENT AND GENTLEMEN,

Vol. I., and page 1, date 1835, of the Transactions of this Institute, commences with a paper on the Nature and Properties of Concrete, by Mr. Geo. Godwin, which may almost be taken as a review of concrete building at the present day, as far as the architectural treatment of it is concerned. The author of that paper showed how concrete had been used largely as a building material by all the principal civilized nations of antiquity; how Alberti had described walls made of it nearly in the same way as it is done now by moulding it between boards; how Pliny had described cisterns made of it; how many of our principal buildings, including St. Paul's and Westminster Abbey, stand upon concrete foundations, dating from Roman and Saxon times, with many interesting details on the composition of lime concretes and their employment on modern works. The subject was again well taken up in this room in 1871 by Messrs. T. H. Wonnacott and A. W. Blomfield. Immense improvements took place between the dates of 1835 and 1871 in all kinds of cementing materials, particularly in Portland cement, which, I believe, may be cited as by far the strongest cement of ancient or modern times, giving us in modern cement concrete an entirely new building material of extraordinary properties, and the two last-named Papers naturally dealt specially with Portland cement concrete, and, as far as its practical working and great strength is concerned, its proportions and mode of mixing, these Papers and the discussion which followed leave little to add. I do not, therefore, propose to touch upon that part of the subject. It may almost be taken for granted at the present state of the subject that nobody will dispute that a building of good concrete is quite as good for all practical reasons as one built of brick or stone. But though there is nothing new in employing concrete in all kinds of structures where strength or durability is required—few, if any, attempts have been made to treat it architecturally in a manner suited to its peculiar nature and properties. Almost all concrete buildings have been, as far as their architectural treatment is concerned, simply copies of stone or brick buildings in a totally different material; the same projecting features and mouldings are mimicked in the material itself, or stuck on afterwards in Portland cement, and frequently the flat surfaces are lined out to imitate the courses of stonework; and even colouring imitation brick mixtures have been devised, in which bastard tuck pointing is displayed with something of the beauty of the genuine article.

The Journal of the Patent Office may often be taken as a gauge of the public interest in any industry and of the progress made in it. The new processes that have been invented in connection with concrete building for the last twenty years may be for the most part ranged under the following heads:—

- (1.) Apparatus for Moulding Walls.
- (2.) Various kinds of Building Blocks.
- (3.) Compositions for making Concrete.

Under the first head may be found a formidable array of uprights and links, collapsible cores to prevent expansion, hinged panels, uprights and corners, plates and boards with various kinds of joints, and horse shoe clamps, brackets for scaffolding, &c., &c. The fault of most of these often very ingenious appliances is their lack of simplicity. The complicated nature of most of them, and their cost is enough to frighten away the intending builder in concrete; and perhaps the elaborate nature of the apparatus supposed to be required has done more than anything else to prevent the more general adoption of concrete by the public. Many builders dispense with the patented apparatuses altogether, and content themselves with forming the moulds of ordinary boards between wooden uprights.

Under the second head are various building blocks made of artificial stone (some hollow and some solid) with various joints; many of these could be quite as economically made in terra cotta or brick, and therefore scarcely come under the head of concrete building proper, which is the subject of this Paper; though it must be admitted that fine concrete used as an artificial stone has great advantages over the above-mentioned materials, on account of the readiness with which it can be employed without heat, and of the variety of materials that can be used in it. I believe there is much to be done yet in concrete blocks and slabs used in conjunction with plastic concrete, and shall have some more to say about it later on.

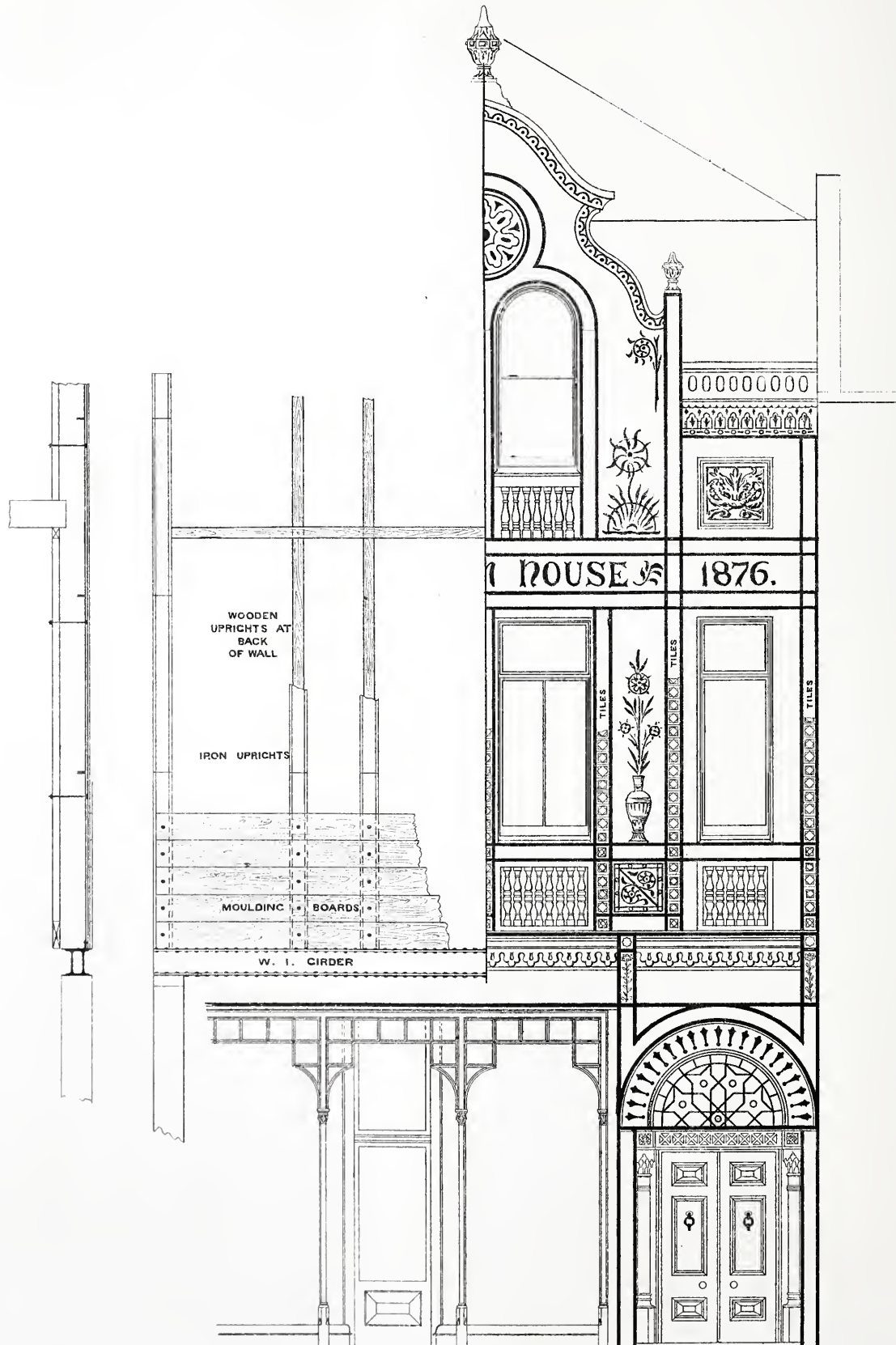
Under this head the system of Tile Concrete Building may be referred to where an outer and inner face are built up of specially shaped tiles or other material and filled in with a concrete backing. And also Mr. Lascelles' system of fixing thin slabs of concrete to a wooden framing. Mr. Lascelles is, I believe, in the room, and will, I hope, give some more particulars about it in the Discussion.

Under the third head—new Compositions—we find several new cements, including the Selenitic invented by General Scott, various compounds for artificial stone and concretes of bitumen, slag, &c., the concrete made of gypsum used by Messrs. Dennett, &c. I think experience proves that of these there is no concrete to equal that made with Portland cement in strength; but others, such as that made with Selenitic will be found to answer very well for all ordinary purposes.

On looking at the result of these inventions, it must, I fear, be admitted that they have not done much in striking out a new line for the employment of concrete, though they may have improved the material, and that by far the most common mode of building still practised, and perhaps the best for most purposes, is the old method described by Alberti, "of placing planks on each side of the intended thickness of the wall and pouring pebbles and mortar between, removing the boards when the compound was set." It is conceded on all hands that concrete buildings are durable, strong, dry, and not expensive; but the general outcry is, that they are ugly, and the question arises, Is this owing to some inherent deficiency in the material, or to the neglect of the subject by architects? and to the endeavour to mould the material into shapes and forms that have been employed in brick and stone built up in a totally different way. I am afraid the latter causes have the most to do with it; and it was in the belief that an assemblage of architects like this Institute could not meet together and discuss the subject without throwing some light upon it, that I ventured to accept the invitation of the Committee of Sessional Papers to write a Paper on such a novel and difficult subject, on which I hope it will be understood that I come here quite as much with the desire to learn as to make the following suggestions, which I will divide under three heads:—

- (1.) How can the apparatus for moulding and constructing concrete walls, roofs, arches, &c., &c., be simplified and turned into artistic account?
- (2.) Does not iron offer special advantages for using in connection with concrete?
- (3.) What is the proper way to ornament concrete walls, arches, roofs, &c., in accordance with the peculiar properties and nature of the material?

EXAMPLE OF A STREET FACADE IN IRON AND CONCRETE.



Alexander Payne, Archt.
4 Storey Gate, St James Park, S.W.

First, it appears to me that one important way of simplifying the apparatus and turning it to artistic account is to make everything about it except the moulding boards a permanent part of the structure, or, in other words, make the skeleton of the structure on both sides in wood or iron or other material, which has been found by experience to work well with concrete, of sufficient strength to carry the moulding boards, and fill in between with concrete, this would give to concrete buildings all the variety of design obtained in such buildings as the half timbered houses of the middle ages. The front of the wall might be framed with a light wood trellis to any required design, and the back formed with uprights, say four or five feet apart, the moulding boards would be secured against these, and the concrete thrown in between. Any window openings, &c., required would be arranged in the framework, the reveals being formed with boards temporarily secured round.

It is obvious that in large towns like London, where timber on the exterior of walls is forbidden on account of danger of fire, the outer framework might be well formed of iron. In diagram No. 1 I show a design for a London shop front façade; the upper part of which it is proposed to erect on this principle. The front framework of the wall is composed of seven uprights, of which the section is given in the detail, attached to the W I girder, as shewn. These are secured by bolts to wooden uprights at the back of the wall, and are filled up in front, as shewn, by ornamental tiles, which cover the bolt holes. The moulding boards are bolted to the uprights in front and behind, and in front three-quarter boards are nailed on, as shewn, to prevent them warping, and to allow a space between them for the plaster for sgraffito decorations. These boards are moved straight up as the work proceeds, and all the horizontal decorations are made in the plaster for simplicity. A great economy is effected here, as this front will really be composed of an old house that stood on the spot worked up again; the old brick-bats and lime refuse being broken up for ballast for the concrete, and the whole bricks used in the internal walls.

This mention of iron for the outer framework of walls brings me to the second general heading of the subject, namely:—How far can iron be advantageously used in connection with concrete. It appears to me that no two materials are so admirably suited to go together as iron and concrete. With the one a light skeleton framework can be made of almost any dimensions and of great strength and lightness, and in the other we have a plastic material that can be readily moulded to any shape, and can be made to enclose the skeleton and give it substance and solidity, and it is well known that once you bed iron and keep it from the air, you entirely protect it from rust and oxidation. But, more than this, iron is just the material to give to walls the tensile and binding strength that they lack, and to counteract the failures that most commonly take place in brick and stone constructions. To give an example from a retaining wall, which was constructed a few years since, a great part was in rubble, constructed in the ordinary way, with buttresses and arches, but there came a place where it was not possible from the requirements of the place to have buttresses except at wide distances apart; if the wall had been built straight, an immense amount of material would have been required, but the difficulty was overcome by building it of concrete, strengthened by iron ties, so inserted as to tie in the weak part of the wall.

I would lay it down as an axiom that concrete offers unusual facilities as a material for walls, &c., from the readiness with which iron or other ties can be embedded in it in any direction to resist any thrust or tendency to separate in the structure.

I have already had the honour of laying before this Institute, in April of last year, a plan for constructing concrete vaults and floors by this method of embedding ties in them, so that they have absolutely no thrust whatever. The same principle may be adopted in a wall for bridging over a wide space, such as a shop front.

A A A shew ties carried through the wall to suspend the beam, carrying the front, thus reducing its unsupported span from, say, 20 ft. to 6 ft. 8 in.; in fact a concrete wall on this principle could be framed in the same manner as a suspension bridge, though a little ingenuity might be required to keep the suspension ties out of the openings.

Where iron is employed in the exterior face of the wall to form a skeleton for supporting the moulding boards, it appears to me that an entirely novel field is opened for façade design; it is obvious that it might take all the graceful forms that it has heretofore done in open ironwork, which, when the concrete was thrown in behind would remain embedded in the structure, and in this way we might have not only open timber work construction, but open iron-work construction.

I now pass on to the question—What is the proper way to ornament concrete walls, arches, roofs, &c., with due regard to the peculiar nature of the material? and I submit that instead of imitating the projections of stone and brickwork, the aim in concrete work should be to obtain as large wall spaces as possible, and as few projections, and to ornament instead by indentations. There has never been a building material employed which offered such facilities for rich ornamentation by this means, at a comparatively trifling cost, as concrete. On the wall are diagrams shewing how moulding boards may be constructed, in which various patterns may be formed and changed at will:—A A shews the frame, B B the changeable dies slipped in from one end; or more simple still, the dies may be attached by a peg, or screw and nut, to the face of a board, as shewn in Fig. 2, and many other methods for producing the same results would not be difficult to find. One need only call to recollection the magnificent ornamentation of the Alhambra, and of the Mahomedan buildings of India, of which by far the greater part is produced by indentation, to realise the extent and beauty of the decoration that might be attained by these means; and I cannot conceive of a better or more suitable method for ornamenting a concrete façade. If it be argued that we have in this country no bright sun to bring such decorations into clear relief, I reply that we have plenty of soot to settle in the hollows and render them blacker, and rain to keep the surface of the wall white, so that no better mode of decoration could be devised for a London climate. How easy would it be by this method to panel round the interior of an apartment, and do away for once with the everlasting wall paper. How easily might dado mould, frieze, and cornice, and even architrave and skirting be formed by the same method. The monotonous white ceiling and centre flower might give way occasionally to a design in panelled concrete, without any great increase in the cost, for the extra labour in the moulds would be in a great measure compensated for by the saving of the material. And by adopting the same method for domes and vaults the advantages of greater lightness and strength for material employed, and greater beauty would be readily attained.

A strong moulded wall plate is carried round the apartment, bound on the outside by a stout wrought iron ring. This wall plate receives the feet of the rafters, which are wrought and moulded on the underside, and slope upwards towards the lantern light in the centre of the apartment. The centering boards are secured to fillets at the sides of the rafters, and on them pateras or moulds to form the panels are fixed:—the concrete is thrown in between and over the joists, and the whole is finished on the exterior with asphalt.

On the wall is an example of a roof and panelled ceiling constructed on this principle.

This method of ornamenting by indentation, or in reality bringing the principle of the printing press to bear upon the ornamentation of a building, has its practical as well as its artistic side. Substitute letters for ornamental designs, and what an agent we have for Willing and Co.! Where permanent advertisements or records are required, or where it is desired to preserve an account of the origin or purpose of any building, why should not such account be printed in the solid wall, in concrete,

PATENT PROCESSES FOR BUILDING IN CONCRETE.

DETAILS SHOP FRONT.
 $\frac{3}{4}$ FULL SIZE.

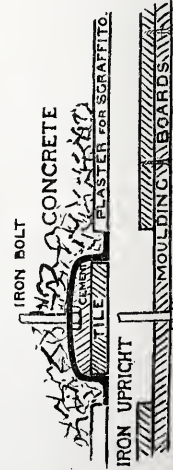
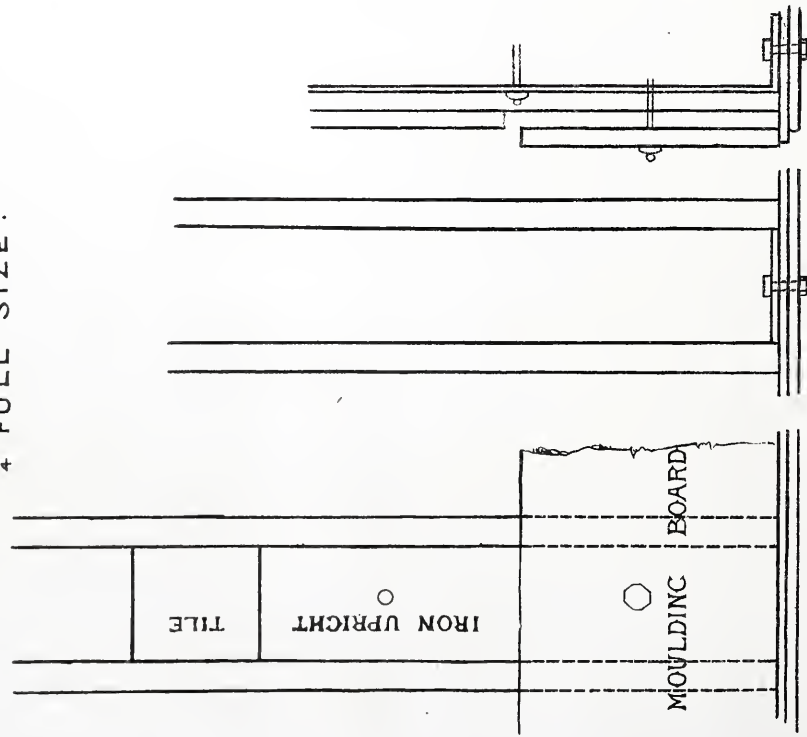


DIAGRAM SHEWING MOULDING PANELS WITH MOVEABLE ORNAMENTAL DIES.

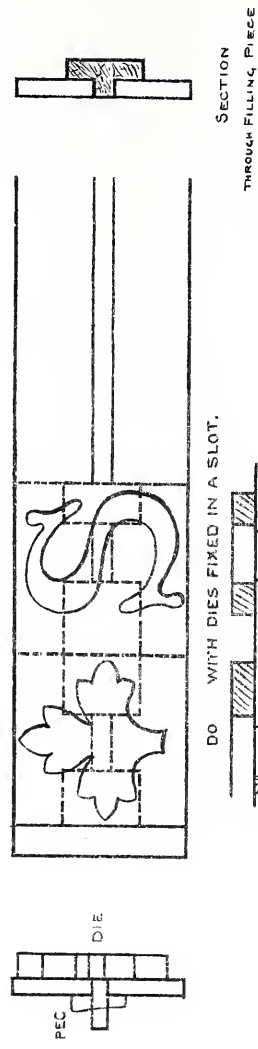
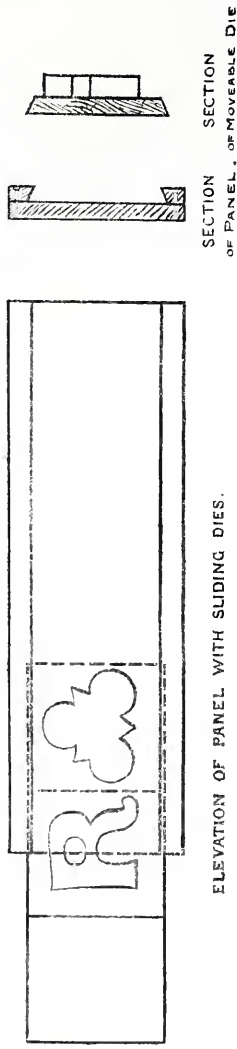
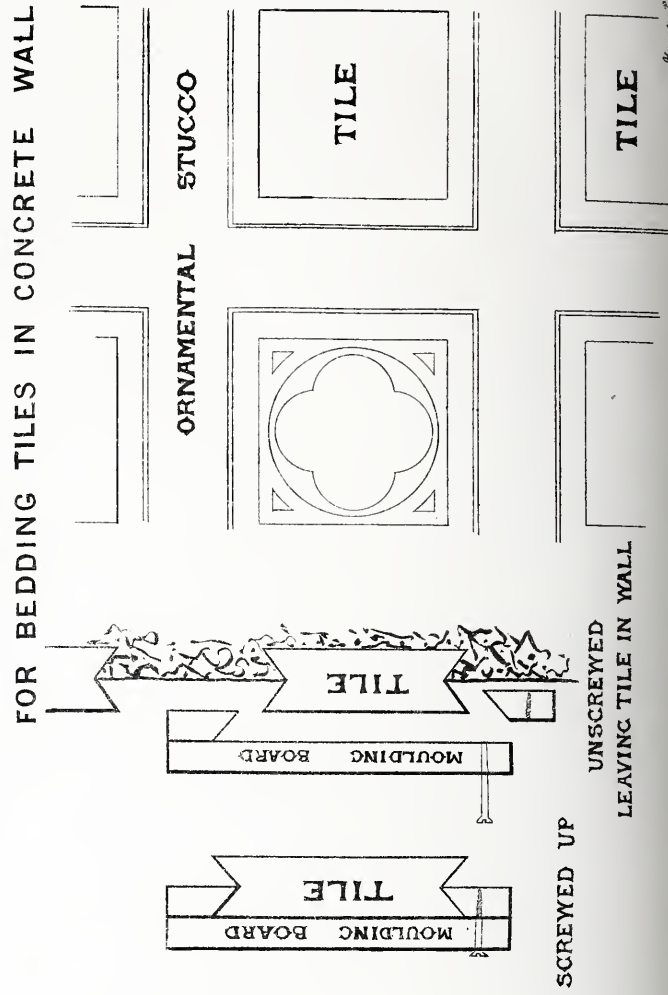


DIAGRAM SHEWING MOULDING BOARDS FOR BEDDING TILES IN CONCRETE WALL



and be made to form part of the structure and design of the building. The words now painted along friezes and string moulds, and round arches might in concrete be stamped far more permanently into the very structure of the wall. Could we not, in fact, in this respect often advantageously follow the example of Assyria and Egypt, and, without going back to cuneiform character or hieroglyphics, still usefully record in our buildings the purposes for which they were erected, or the exploits of those whose memories it was desired to perpetuate therein?

Another class of decoration may be mentioned as being easily produced by the same means, namely, inlaid work. In the next Diagram is shewn how the moulding board above described might be made to serve this purpose, and how tiles and plaques of various materials might be incorporated in a design so as to be firmly bedded into the substance of the wall in a way that could be accomplished with no other material, and would also themselves form an admirable key for a filling of coloured cement or other material.

The moulding boards are formed to clasp the tiles by means of a removable piece, and the tiles or plaques have a V shaped groove along the edges, as shewn. The tiles are built up in the frame, and the concrete is thrown in behind; when set, the small screws are taken out, which release part of the frame; the moulding board can then be removed, and the tiles and plaques remain embedded in the wall to serve as a key for filling between. It is clear that almost any pattern may be formed on this principle, and if desired, instead of cementing between the tiles forming the key, other tiles or plaques, or slabs of marble, or compressed concrete, or even plates of metal, may be inserted. In this way something of the sparkling effect of the inlaid work in churches of Florence could be attained, with materials close at hand.

I will here also just refer to another class of panelling that could be well taken as a model for concrete decoration, namely, the flint panelled work of Essex and Suffolk. What more suitable material could we have than concrete for moulding into the panels, and if the backs were formed of coarse concrete they would form an admirable key for the flint filling.

Another and obvious way of ornamenting concrete is by ornamental plastering and cement rendering, and particularly by sgraffito. It may be argued that it is quite as easy to render a brick wall as a concrete one, and that this is merely covering up the material; but there is this to be said in favour of the concrete, that the rendering is really a finer quality of the very same material, and the whole when complete forms a compact and solid mass of the same nature throughout, and never likely to separate, as sometimes takes place between a brick wall and its plaster rendering. It is impossible to have a better key for rendering than coarse concrete, and any method of plaster decoration appears to me to be a most suitable and legitimate mode of ornamenting the material. Sgraffito especially seems to form so good a medium for rich decoration that it is astonishing more use is not made of it. I think the art department at South Kensington have done great service by the special attention they have lately directed to the subject.

The various methods above described of using iron and concrete together, and ornamenting the latter, appear to me to be particularly available for roofs, vaults, &c.; and at the risk of attracting adverse criticism I have ventured to hang upon the wall a diagram shewing a suggestion for a vault and colonnade on this principle. In this it is the intention to frame the whole in a skeleton of light iron, sufficiently strong to carry a centreing and moulding boards of wood or thin sheet iron. This light iron would be left in to form a permanent part of the structure, as shewn. The columns and the spaces between the ribs of the vault would be filled up with concrete; by moulds fixed on the centerings these spaces could be panelled to any design, so as both to render them ornamental and increase their

lightness. There is no doubt a vault of this description could be made of vast span and great beauty at the tithe of the cost of a stone one, and without the necessity of the huge buttresses which would be required to counterpoise the latter. A series of iron rings bedded in the fans of the vault would resist all tendency to spread. The ornaments on the bells of the capitals are intended to be of sgraffito.

The next Drawing shews a design for a dome on the same principle. The panelling would be formed by box moulds secured to the centering, which again would be secured to a light skeleton of iron work, filled up with concrete, and with strong wrought iron rings to resist the tendency to spread. This roof would be very similar in its principle to the dome over the Pantheon at Rome, which is composed of brick ribs and rings similarly disposed to the ribs and ties mentioned above, and the panels are filled in with a description of concrete, with ornamental sinkings; but it is obvious that the brick ribs and rings have no tensile strength beyond what is given by the cohesion of the mortar; in fact the rings merely serve to support the panels, and in no way serve to prevent the spread of the structure, so that enormous walls are required to preserve the stability of this dome: whereas by using iron as described above, the thrusts would be entirely neutralized, and the only force to be resisted by the supports, as far as the building itself was concerned, would be pressure due to weight. I will not weary my hearers by going into details of the many architectural features which could, I think, be advantageously constructed on this principle, such as turrets, spires, and all kinds of roofs, corbels under oriel and bay windows, &c., but conclude by briefly recapitulating the three points which appear to me to be most important in treating of concrete as a building material, namely:—

To use it for a filling in conjunction with a framework of iron, wood, or other similar material:

To ornament it by incised work instead of imitating the ornaments used in brick or stone construction:

To use iron embedded in it for the purpose of giving tensile strength to prevent fractures caused by thrusts of arches, vaults, &c., instead of opposing them by buttresses as is done in brick or stone.

The PRESIDENT: I do not know who amongst the gentlemen present have given the greatest attention to concrete construction; but I hope those who are conscious of their own experience will be kind enough to give us the benefit of it. Perhaps Mr. Charles Barry will commence the discussion.

Mr. CHARLES BARRY, Fellow: You have been good enough to call upon me, Sir Gilbert, but I have not done anything in it myself, and I confess I have had, and still have, great hesitation in attempting to use concrete, or permitting its use—not from any want of confidence in the character of the material or its strength, but for reasons to which I will advert. At the same time I think no apology was needed on the part of the author of the Paper for his advocacy of the use of concrete, more especially of Portland cement concrete. I should have every confidence in its being used effectively and substantially if the construction of the building on which it was used were superintended by a gentleman so much master of the subject as the author of the paper. He has thrown out some curious and, I think, valuable suggestions, especially that of constructing the framework of his structure in thin iron, and making that thin iron do more than its ordinary work by embedding it into a close-fitting material, such as concrete is, thereby preventing any twisting movement, and so getting its full strength, tensile and compressive, out of it. It is well known that iron has been effectively used in connection with something like concrete in place of stone by the Building Society over which Sir Sydney Waterlow presides, in providing dwellings for the poorer classes in London, and they have

adopted a kind of concrete material made with coke breeze and Portland cement for steps and landings, and beams and lintels, the major part of the strength of which is due to the embedding in it of very small pieces of bar iron, and inasmuch as the iron is placed in the position of its greatest strength, and is embedded so that it is unable to move, they get, with small bulk, great strength, and thus a very economical and useful material. But, I think, ordinary concrete building is attended with this danger. If, with all its great advantages, its great strength, and its great durability, it is used by inexperienced people, or by contractors desirous to get over their work quickly rather than do it well; it seems to me to offer greater opportunities for scamping than stone or brick. I dare say it is in the experience of many present that several concrete constructions have failed probably only from want of due care in the mixture and character of the material, and, if failure occurs, it is more disastrous than in the case of stone or brick, which give indication of failure before an accident occurs. If concrete fails, it fails suddenly and disastrously, and that fact has to be set against its advantages as a building material. Many of the suggestions in the Paper are most interesting, as, for instance, that relating to modes of decoration effected by indentation and projection in the moulds, but I must take leave to doubt whether, with all the ingenuity of boards, sliding panels, and dies, the result will be entirely successful. I should like to hear more definite evidence on this point, and I was also in hopes that the author would have given—what we wish to know—viz., some notion of the cost of producing this effect, as compared with other methods and other materials. He has not done so, and possibly the experience he has had of this kind of ornamentation may not have been sufficient to enable him to do so. Then, again, he speaks of throwing in concrete after forming a framework of iron or wood; but, if it is to produce this ornamental surface, great care would be required, and, I apprehend, a much finer description of concrete material than is ordinary would be required to be used to produce that effect, and then the economy might be doubtful. At the same time a very interesting question has been brought before us. It is a subject for the future to consider how far concrete can be used in substitution for other building materials with which we are familiar; therefore, our best thanks are due to Mr. Payne. I have no doubt considerable discussion will take place on this subject, and it may be too early to thank him for his Paper, but at the proper time I shall be very pleased to move a vote of thanks. The author has alluded to a gentleman who is here to-night, Mr. Lascelles, who, to his knowledge, has paid a great deal of attention to this subject, and who probably has some information to give which might precede the further discussion.

The PRESIDENT: I believe the gentleman is present who put up this model of a portion of a house, and we shall be very glad to hear him.

Mr. W. H. LASCELLES, Fellow.—I shall be happy to tell you all about it. This is a portion of a house, and, is composed of slabs of concrete about an inch thick, formed of Portland cement and coke breeze, which is the material used by Mr. Matthew Allen in the erection of Sir Sydney Waterlow's houses. The colouring of these slabs is formed of Spanish brown. There are but few colours which will stand, and Spanish brown is one. This is mixed with the concrete and poured into the moulds. I have a mould here [exhibiting it] which is formed of wood, and is of a very simple character, and in this mould the slabs of concrete are cast, and the pattern represents tiles. The mould is first oiled with common oil, and then the concrete is poured in and struck off level at the back. It is removed from the mould in three or four days, and the slab is then ready for fixing on the walls. These [exhibiting] are the iron rods which are embedded in the concrete in the middle of the slab. They are one-eighth of an inch thick, and cost about 2d. each slab, and the entire cost of a slab 3 feet by 2 feet is 3d. per square foot. These slabs were brought from Croydon to-day, and this model was put up in two

hours. The same description of slabs are used for the roof, and they are perfectly water-tight at the joints.

The PRESIDENT.—What is the concrete formed of?

Mr. LASCELLES.—Gas breeze and Portland cement. I would call attention to a sash bar in my hand adapted for rough plate glass, which can be set in cement and requires no putty or paint, and the bar will last as long as the glass.

The PRESIDENT.—Will it stand the slamming?

Mr. LASCELLES.—You can put in a stronger piece of iron to meet that. This sash bar has not been touched since it was taken from the mould. The window at the other end of the room was designed by Mr. Norman Shaw for the studio of Mr. Marcus Stone. That was put into the mould on this day week, taken out last Saturday, and put up here to-day. There are two rods of iron running through the head and sill, and one rod through the mullions, so that the whole thing is thoroughly tied together. The cost of this window frame is less than a wooden one of the same size. I have built a house entirely without bricks, merely with concrete—chimneys and all—and one peculiarity of this material is that it will hold nails and screws as well as wood, and the slabs are very handy for fixing. This [exhibiting] is a ceiling slab of concrete, one inch thick, and this we screw on to form the ceiling. It is not cheaper than lath and plaster, but it is fire-proof, and very durable.

Mr. C. BARRY, Fellow.—What has been the test with regard to being fire-proof?

Mr. LASCELLES.—There has been a great fire in which everything was destroyed except the concrete.

Mr. WHICHCORD, Fellow.—Was there any iron in the middle?

Mr. LASCELLES.—I apprehend there was, as they were built by Mr. Matthew Allen.

Mr. WHICHCORD.—What about the expansion of the iron from heat?

Mr. LASCELLES.—That I cannot say; but I can state that testing with a thermometer the rooms built of these slabs are warmer than those built of nine inches of brickwork. This [exhibiting] is a floor slab. The upper surface forms the floor, and the under one the ceiling, and by putting these down you form floor and ceiling at the same time. I have made joists of concrete, but I found they cost more than wood. A perfectly fire-proof building can be constructed of this material, even to the sash frames.

Mr. WHICHCORD.—Have they been tested with fire?

Mr. LASCELLES.—Yes, to a white heat, at Croydon, and when cooled they were unaltered.

Mr. WHICHCORD.—With the iron inside?

Mr. LASCELLES.—That I cannot say.

The PRESIDENT.—What is the effect upon the bars in case of fire?

Mr. LASCELLES.—They are fire-proof; fire will not touch them. These slabs are more fire-proof than iron doors, and they have been patented for the doors in fire-proof warehouses, and one of those doors have been sent to the Metropolitan Board of Works by Mr. Matthew Allen.

Mr. CATES, Fellow.—What is the thickness of the doors?

Mr. LASCELLES.—Two inches; and they will hold nails and screws as well as wood.

Mr. CATES.—Do you propose to make the window sashes of concrete?

Mr. LASCELLES.—That [referring to the window exhibited] will be filled with lead lights.

Mr. CATES.—There is no iron frame?

Mr. LASCELLES.—No: the lead lights will be put into the concrete frame with an iron saddle-bar across on the other side.

Mr. BARRY.—What is the cost of this form of construction?

Mr. LASCELLES.—A house built upon this principle would cost, I calculate, about 20 per cent. less

than one built in the ordinary way, and I think I shall be able to reduce that by-and-bye. These slabs are made at 3d. per-foot, which is cheaper than brick walls.

Mr. CATES.—With respect to the joints, how do you exclude drifting rain?

Mr. LASCELLES.—These slabs are 3 feet by 2 feet. In every part of the house the joint comes in the middle of the stud, and they are screwed on, so that no rain can get through.

Mr. CATES.—Are they butt edges?

Mr. LASCELLES.—Yes, but the rain never gets in. I have had houses built for two years and not a drop of rain has gone through, but on the upper part I find it necessary to bed a tile down on to the joint.

Mr. CATES.—Your mortar will shrink and your timber will shrink. When the timber shrinks, the mortar in which you bed these slabs will fall away. Then do you think they will exclude rain?

Mr. LASCELLES.—If the timber shrinks it will draw the joints together. I have a house built on this principle which has been standing two years, and no rain has ever gone through the joints.

Mr. CATES.—That is possible, but I think that is a weak point: and though a house may have stood two years, it may not stand weather-tight another two years, for the timber may not have shrunk so as to produce any effect with regard to the water getting through the joints, and the mortar may shrink and let in the water. I call attention to this, because in other respects your invention appears to be admirably adapted for general use.

Mr. J. M. ANDERSON, Fellow.—Why should you not break the joints?

Mr. LASCELLES.—Because I wish to present on the inside a panelled appearance, and the studs being 3 feet apart give the appearance of a panel. If the joints were broken, I should have to put the studs 18 inches apart, and that would destroy the panel appearance.

The PRESIDENT.—Could you not make an edge for a butt joint?

Mr. LASCELLES.—It is quite unnecessary, Sir. I think when you have got a thing perfectly right it is a pity to spend more money in altering it.

Mr. CATES.—Then all the designs must be multiples of 3 feet by 2?

Mr. LASCELLES.—They need not be so necessarily, but if not you must make special tiles. If a design is sent in for any dimensions which are not multiples, you can at additional cost provide them.

Mr. J. B. REDMAN, C. E., Visitor.—Believing that there is a great future for concrete in connection with architecture, I will beg permission to say a few words on the subject. There is, no doubt, a great deal of force in the objections urged by Mr. Barry as to the hasty or indiscriminate use of such a material for building purposes; but when we consider the great revolution that has been and is still being effected in the construction of vast works by the introduction of concrete, and when we also reflect upon the casualties attendant upon the early introduction of concrete in engineering works, no doubt what has been developed by that experience, and by the tests now applied to concrete in engineering works, may also be brought to bear in the introduction of the same material for building purposes. Of course, it is a remarkable fact, that although concrete has been used from the very earliest periods—it is, I believe, found in the remains of ancient Rome, and it has been used from time immemorial on the shores of the Mediterranean—formed of pozzuolana for the foundations of harbour moles—yet in this country the introduction of this material is of comparatively modern origin. It is stated in the Paper, and mentioned by other authorities, that it was used in the foundations of St. Paul's by Wren; but one of the earliest systematic applications of concrete was by Sir Robert Smirke in 1811, for the foundations of the Millbank Penitentiary on the suggestion of the elder Rennie: "to consist of firm gravel or ballast, freed from slime, mud and sand, except that a small portion of

"y^e latter shall be intermixed with other material, in y^e proporⁿ. y^e Arch^t. shall direct, y whole "to be well *puddled* and cast and mixed in *lime water*. The top of y^e said *walling* to be "made perfectly level to receive y^e brick^k. of y^e build^s." — (Smirke's Specification). And in 1818, concrete was first used in engineering works by Mr. Ralph Walker in the formation of the foundation of lofty boundary walls of the East India Docks, also on the suggestion of Rennie. A Paper was read some years ago before this Institute, describing certain operations in underpinning the defective foundations of a government building, and what is palpably the defect of concrete, viz., the enlargement of the mass due to the imperfect burning of the lime was evident in that particular instance, and was applied on that account. That was described in Mr. Godwin's paper. The core of the Admiralty Pier, at Dover, is formed of cubes of concrete of six to ten tons weight. Some of those early cubes suffered disintegration from imperfect induration after three months of manufacture. The blocks were taken out of the moulds three days after manufacture, and the practice subsequently was to keep them from six to nine months before they were placed in the work. I saw myself a remarkable instance of concrete construction in the case of a heavy wharf wall on the southern side of Dover Harbour. The body of the wall was of concrete faced with ashlar. From the imperfect slacking of the lime constituting the concrete, or from being used hastily, the entire face of that wall was projected several inches from the enlargement of the concrete. That was met by taking down the concrete, and putting in a brick backing.

Concrete has been used to a great extent, tentatively, for foundations and forming the cells and pockets of heavy retaining walls; but it is due to the introduction of Portland cement, and the superior quality of concrete produced by that material that it is now being used almost as generally for external work as for foundations. Concrete is being used on a large scale in the enlargement of the basins at Chatham Dockyard. The quay walls are forty feet in height and are built of concrete faced with brick and ashlar, but for the last basin entirely of concrete, upon a most treacherous foundation. Portland cement being used in the proportion of one to ten. The material is excavated from the site, and is all hand made owing to the employment of convict labour. At Dover the early blocks of concrete used were hand-made, the material being turned over with the shovel, but subsequently a revolving drum was made use of for effecting a more perfect admixture of the material, on which its success entirely depends. A similar apparatus is now employed at works at the Commercial Docks, which effects a perfect admixture of the material. The engineer, Mr. Maconochie, is using concrete in large masses with draft arrases and set the same as stone work and it presents the appearance of ashlar; but at Chatham they are putting in the face of the work behind boarding similar to the way described in the paper, and the face is formed of Portland cement concrete mixed with a small proportion of furnace slag, which makes a very hard surface. I may mention the application of concrete in the cylinder work, which is now so popular. Some quarter of a century ago I put down some cylinders near Gravesend. The cylinders were of iron filled with concrete, which was mixed with Roman cement and blue lias; but in consequence of the price of iron at the present day, and the facilities for obtaining materials for the purpose, cylinders are now being constructed of concrete. There is a quay wall 1,200 feet in length at Glasgow, built upon two rows of cylinders, and on the opposite side similar quays are being built upon cylinders made entirely of concrete. At the London Docks there are also cylinders built of concrete. The Aberdeen Steam Company, under Mr. Maconochie, are inclosing a large area on a difficult site with the Thames on one side, and the gravel largely charged with water, bounded by a graving dock on one side and by the entrance to a public wet dock on the other. The engineer was desirous to surround the site by a margin of work down to the blue clay. He was afraid of pumping for fear of drawing the sand from under the docks on each side. He, therefore,

very ingeniously, I think, designed a margin of cylinders formed of concrete to surround the entire site in two rows, and this work is now in operation. The body of the wall is of concrete, but the engineer has not so much faith as they have at Chatham, as he does not form the entire face of the wall of concrete, but cases it with brickwork. Ranger's concrete was a well known material, and some houses were built with it at Northfleet. He also built a quay wall of 1,000 feet in front of Woolwich Dock Yard, but this failed for want of sufficient induration of the material, the cement being of an inferior quality to Portland, and the river wall flaked off from the action of the atmosphere. The wall was rebuilt in stone and brick. A dry graving dock in the same locality was not sufficiently strong to stand the pressure. Mr. Stoney, the engineer of the Dublin Ballast Board, has accomplished some remarkable feats in the manufacture and application of concrete blocks, he having deposited some in deep water of 350 tons weight, which was accomplished by machinery on floating barges with derricks and the employment of a steam engine. In this way blocks of 124 tons were deposited for facing rubble stone slopes. Mr. Kay, of Aberdeen, has constructed piers there of concrete in bags for the base, surmounted by coursed blocks, and capped with liquid concrete put in behind temporary frames. Another pier is constructed entirely of bag work. These are some of the most noteworthy instances in this country of the use of concrete which occur to my mind at this moment. Concrete of modern Portland cement, of best quality, is now equally applicable, whether buried in the foundations or body of the work, or externally, on land, in deep water, or subject to tidal and atmospheric influences, and if of proper weight and strength is equally successful in all these varied cases.

Mr. T. BLASHILL, Fellow,—I think our interest is rather in walls above ground than in foundations. The author has dealt fairly with regard to one of these houses. He contemplates dealing with a framework of wood in close contact with concrete; has he considered the effect of the expansion of timber when new concrete is poured upon it? I have heard of, though I have not seen, cases in which even the insertion of the ends of timber in concrete caused material damage to the building. Information on that point is desirable, for however feasible the use of iron and concrete may be, there is considerable difference of opinion as to the effect upon wood. Another matter on which I would ask for information is, as to the effect of moisture—not the passage of moisture through the walls into the interior of the house, but the effect of the condensation of the moisture of the atmosphere on the interior walls. When a wall is hard and impervious to moisture from the exterior atmosphere, there is under certain conditions of the atmosphere a very rapid condensation of moisture on the inner faces of the external walls. Information on that point would be useful. I have heard of it, though I have not seen cases where this deposit of moisture on concrete walls has been very considerable. With regard to the concrete roof exhibited here, without saying anything about the principle of construction, I remember the late Mr. Charles Fowler mentioning his experience of a roof in the case of a church which he built in the South of England. He seemed to have constructed the roof precisely on the same principle as this, the thickness being 14 inches of solid concrete. The result was that as soon as the building was used, and when gas was burned, water dripped from the roof, and he was obliged to line the ceiling with wood, or wood and plaster, to avoid that. These are the only two matters it occurs to me to mention. With regard to Mr. Lascelles' invention, it strikes me he has aimed at a close imitation in appearance of the weather tiling used in Kent. I see no reason why it should not do; the only question is the question of cheapness, and for my own part I should be inclined to adopt the principle which is most economical.

Mr. E. NASH, Fellow,—It seems, sir, that notwithstanding the high antiquity of concrete, we have something yet to learn respecting it. I have here a piece of Nature's concrete, which may, perhaps, be about 13,000 years old. It is from a field at Beckenham, from which gravel is extracted and in which there are large detached and rounded masses of this concrete, so hard that the workmen's

pickaxes cannot remove them, and consequently these masses give the field the appearance of being covered with haystacks. It is very similar to the artificial concrete we now commonly use for foundations, and perhaps with age ours may become equally hard with the natural concrete alluded to. I state it to be about 13,000 years old, because it belongs to the formation called the Woolwich and Reading beds, which, if astronomers be right, would give it about that age, but that is a vexed question. Our subject now, however, is the modern use of concrete as a building material for walls. I cannot quite clear away my doubts with regard to it as a material for walls above ground, and it is proper that architects should be cautious. I have some misgivings upon points named in Mr. Payne's excellent Paper, especially in connection with that important axiom in all building, viz., homogeneity. Concrete is in itself a very homogeneous material, but when it is proposed to introduce bars of iron in a perpendicular position, combined with concrete to form a column, I fear that homogeneity will be lost, for I have found that concrete, though it swells in the action of setting, afterwards shrinks: and though it may do this in a slow manner, I believe that the time would arrive when the two materials would quarrel with each other, and then I am afraid that the consequences in respect of stability of structure would be very serious. I have before alluded in this room to the shrinking of concrete above ground. That it is an exceedingly valuable material for works not exposed to the air is indisputable, but for house walls I have some doubts, although I am acquainted with some excellent walls that have been built with it. I might refer to numerous illustrations of the shrinkage of concrete in which it is conspicuously displayed, but I will only name the long sea wall at Bognor, where the sea is apt to make great inroads. In that wall at regular intervals of from 70 to 100 feet there are large perpendicular fissures from top to bottom, and this occurs in all walls of the same kind that I have seen. With regard to the valuable observations of Mr. Payne as to the introduction of iron and timber in concrete buildings, I have no doubt much may be done in that way, but it must be done with caution, and at present I cannot bring myself up to the mark with regard to the satisfactory condition of such buildings where two or three materials of differing natures are combined together, because if there be not harmony between them some untoward result must occur.

Mr. T. L. BANKS, Associate.—Some two or three years ago I was smitten with the concrete mania, and in the North of England I had several buildings erected in this material. Now I must confess the more I know of it the less I like it. At the same time it is not for us, as architects, to reject it altogether as a building material. It may have qualities specially adapted to some of the wants of the present time, and only requires that we should know how to use it properly. We must all admit that the best examples of architecture handed down to us are the result of men striving to minister to the wants of the age in which they lived, and availing themselves of such building materials as were within their reach. If we would give a distinctive character to the architecture of our buildings we must work upon the same principle. To seek after novelty for novelty's sake, whether of form or material, will land us only in the grotesque. But as wants are new with every age, so will be the architecture which serves a special need. Now what are the special demands or wants of the present day? They would appear to arise in the first instance from our manufacturing industries, and in the second from our railway system. These modern developments, combined with iron as a constructive material, are surely and distinctly by the very urgency of their demand, creating a new class of buildings. Concrete may or may not be a requisite building material in the erection of some of these buildings, but it certainly meets another demand of the age, viz., to utilize what has been esteemed waste. The chemist is given the refuse from our gas works, and he returns colours that rival the rainbow, and also carbolic acid. And if we are given the slime from the bed of rivers, or even, as by General Scott, the sewage from our cities, and are told to go and build with this, it is no use for us to turn a deaf ear to the call, but rather let us study the

wisdom of the demand and the nature of the material. For engineering purposes and substructures concrete seems eminently adapted, but it is doubtful how far it is wise and safe to use it in the erection of ordinary buildings, imitating, as is usually the case, all the forms and dimensions of stone and brick work. There are many elements of weakness in this material, and dangers arising out of its manufacture. Mr. Nash has drawn attention to one, viz., contraction. I can fully corroborate all that he said with reference to the vertical fissures or cracks in a long wall. These cracks usually occur at regular intervals, their frequency depending upon the composition of the concrete. I know one wall of very considerable length in which the cracks occur at intervals of from twelve to fifteen feet. It is the same with concrete pavement. It is rent across by this contracting force, unless worked in separate slabs of eight or ten feet square. The worst feature about this contraction is that it is impossible to say when it ceases. Almost three years ago Mr. Drake (who is present) built for me a church and schools at Whitehaven. Very soon after the work was completed cracks manifested themselves at all the weak places—that is, wherever there was the least substance of concrete. I have carefully noticed these fissures, and had them filled more than once, and each time I go to the North I find this process of contraction still going on. Another consideration should make us very careful in its use, and that is that cement is not all of the same quality, some setting more rapidly than others. If in the same wall cements of different quality are used, we have the chemical action proceeding at different rates, and producing contrary forces. Besides all this we must remember that it is claimed as an advantage for concrete that unskilled labour can be employed. This may be a pecuniary advantage, but it brings with it an element of danger; good concrete can only be made of good material properly mixed, and when care in the selection of the material and the mixing of it is absolutely essential, uneducated labourers are not the safest men to employ. A client of mine in the North has made many and valuable experiments with reference to concrete as a building material, though more particularly with slag from his iron furnaces, and I am of opinion that properly prepared slag, produced by the smelting of hematite ore, is as good, if not better, than any cement known. One conclusion we have arrived at is, that the slower the material sets the better it is. We therefore retard the chemical action by keeping the concrete damp. In a large mansion now being built for him we have rejected the ordinary method of building between frames, and have preferred concrete blocks, setting the same as in ordinary masonry work. These blocks are subjected to a pressure of 150 tons to compress the material, and to put a fine polished face on the surface. They are then either kept under water, or water poured over them, for the next two or three weeks. The effect at first was very pleasing, but it is evident there is some power still at work, for twelve or eighteen months after being set in the building a sulphurous powder appears on the surface. I am of opinion that the only valid excuses for using concrete are that it is the only available building material in the neighbourhood, that it is the cheapest, or that it uses up what otherwise would be waste and a disfigurement upon the face of the country—the slag heaps from our blast furnaces. It seems to me very proper to use concrete if made from slag for buildings connected with ironworks, and for the workmen's cottages. I can see no advantage or reason for using concrete in neighbourhoods where other material is equally available and not more costly. Mr. Payne, in his interesting Paper this evening, has proposed certain schemes for ornamenting the outer surfaces. What little experience I have had with concrete would seem to contradict those theories. I think it will be impossible to move the dies when once the cement is hardened against them, and it is very questionable whether the process of decoration suggested would not prove more expensive than decorations obtained in the ordinary way.

Mr. CUNNINGHAM (representative of the Broomhall Tile and Brick Company): I beg to call attention to the facing blocks for concrete walls which have been largely used in some railway works about four miles from Dublin, where they utilised the ashes and slag from the furnaces and made

concrete of them, and a great many houses were built of that material with good success. I could mention other examples in house building equally successful, more especially at Mortlake and Richmond.

Mr. BROUGHTON explained the principle and action of his Patent Concrete Building Appliances, which had been erected in the room, and replied to various inquiries with regard to the action of wood in conjunction with concrete. He stated that he had never seen any vertical fissures in concrete walls constructed in this manner, and particularly referred to the School Board building on Holborn Viaduct as a very successful application of concrete.

Mr. C. FOWLER, Fellow: I would just say a word in correction of what Mr. Blashill has stated with regard to the building by my late father, in which condensation of moisture in the roof took place. The roof was not formed with concrete, but consisted of three courses of tiles and cement. I happen to be acquainted with some practical matters in connection with concrete, and I therefore beg to move the adjournment of this discussion.

Mr. ALFRED GILES, C.E.—As a visitor I should like to occupy two or three minutes. I have been much enlightened and interested as to the mode of decorating concrete faces, but I confess I was a little astonished at the proposition to build a structure compounded of iron and concrete, and even the addition of wood. I had always thought it an axiom in building to do away with the mixture of materials. I would rather trust to concrete by itself, or to iron by itself, and I had thought bond timbers were exploded. I cannot understand how a concrete wall of the thin nature in which it is applied to building can be satisfactory in conjunction with bond timbers, which will shrink. I have used concrete largely in engineering works, principally for foundations and quay walls, and I confess to the difficulty which a gentleman has mentioned, arising as I imagine entirely from the shrinkage. I have never constructed a long quay wall without certain fissures occurring, which I can only account for by shrinkage. Something was said about facing concrete with stone or brick. I have done that largely in the case of dock walls twenty-five years ago, facing large masses of concrete with rubble masonry. In such cases I have preferred to make the back of the face walls perfectly upright, and to introduce transverse layers of hoop iron. According to theory the concrete should have separated from that face, and I believe when the lime is not properly slaked blowing and separation will take place. Having occasion to cut through these walls I have never found any separation between the concrete and the masonry. There is one other point I would refer to. When I saw that apparatus for making a thin wall of concrete I was disposed to question the economy of a concrete wall as compared with a brick wall, and if I had to construct a nine-inch wall I should prefer brickwork to concrete. If it was made in a larger mass I imagine it would be satisfactory, but this is brought forward as a question of expense. One thing I can vouch for, viz., that with ordinary concrete you cannot trust it to be water-tight. I have used it in large masses, but have never found it reliable against the pressure of water. As to the model of the building exhibited here, I, as an engineer, should not call that concrete, but tile work. It is pretty, and no doubt useful, and may be water-tight. There was some discussion about putting in concrete in very large blocks. I have never used it in that form myself, and I do not think it is necessary to go to the expense of moving these large blocks. I have used concrete in foundations in a liquid form, and under water, and if it is made of proper materials it will set as solid as any blocks.

The PRESIDENT.—What cement did you use?

Mr. GILES.—Simply blue lias lime. It will sometimes blow, but there is the same risk with cement: you may get one lot good and another bad: but you must trust to the respectability of the manufacturer to ensure a good article, or your work may fail from the imperfect quality of the cement.

The motion for the adjournment of the Discussion until the 15th of May was then unanimously agreed to.

Royal Institute of British Architects.

At the Ordinary General Meeting of the Institute, held on Monday, the 13th of March, 1876,

C. H. COOKE, Fellow, in the Chair, the following Paper was read :—

ON SIXTEENTH CENTURY ENGLISH GOTHIC. (1500-30.)

By J. D. SEDDING, Fellow.

THERE are, I suppose, two ways by which a student usually approaches the consideration of any given epoch of Art. He either hits upon it casually in the course of methodical research, when he takes up type after type just to analyse it, and perchance drop it again with the same indifference he has felt for others before, or, he is led to it by the force of personal sympathy. As far as the bare results of analysis go, one method of approach may be as good as the other, and yet how widely different is the impulse and incentive to study.

We may be quite sure that if a man feels the fellowship of a period, it is because it responds in some special way to ideals which he has formed in his own mind; and we may be as sure, that should the phase of art which he has learned to love, be placed under some prejudicial ban, his interest will be quickened and elevated in exact proportion to the detraction of others. But, having lighted on a period to which he feels drawn by the indefinable attraction of personal sympathy, how is the student to ascertain that it is worthy of exploration, or that his natural sensibilities may not be duping a perverted judgment? If he is really in doubt on this point, he will, I suppose, at once proceed to test it by the approved standards of productions of its class, which probably will resolve themselves into something like the following.

He will determine whether it bears the marks of a self-sustaining life, whether its creations hold an independent or a relative value to other associated periods—that is to say, whether in an historical sense the productions form a chapter in annals that would be incomplete without it. And, lastly, he will determine if the actuating motive of the work is good, in that large sense of the word which divides good into pleasant, profitable, and honest. A few simple principles of this sort the student will apply for himself by direct personal observation, being somewhat mistrustful of books.

It so happens that the period I have selected for examination is a thoroughly unpopular one, but, having submitted it to the critical tests just mentioned, I have come to the conclusion that they can be answered in the affirmative. That one should be able—from a student's point of view—to speak of an unpopular and neglected period of historic art, seems to me matter both for regret and explanation. For, to the lovers of architecture, nothing relative to the object of their pleasure or employment is indifferent. And in trying to find reasons for this state of things, my first reflection is one aimed at ourselves. It appears to me that criticism—which in other fields of art is as free as the winds of heaven—is, in the domain of architecture, trammelled by certain restraints.

To put these restraints into definite shape, I should say that they take the threefold form of (1) a blind obedience to conventional opinion; (2) an overstrained niceness of taste; and (3) the claims for fidelity to isolated schools of practice now reigning. Since separated schools of design do exist among us, it is only natural that an architect in practice should be expected to give in his silent adhesion to one or other of them; but, having adopted some special side of architectural practice, he will soon find that he is also somehow expected to look at matters around him from the carefully defined standpoint of his school. And should he venture to take an airing beyond the strict diocese of his allegiance, or set its recognised creeds at defiance by any individualism of taste, he comes into collision with certain self-regarding prejudices, whose tendency embarrasses personal research, fosters an intolerant spirit, and encourages mere unauthenticated book-knowledge. To contrast this picture with one that is perhaps Utopian, it is pleasant to imagine oneself transported into what I would venture to call a more healthy period of art development, into a period which—since our art must be retrospective—would fearlessly face every type of bygone times, would call forth and expand the varied resources of each, and sharpen artistic insight to discover worth for its own sake, regardless of the channel in which it flows.

With the phase of art now before me, and my sense of its ill-treatment, I need not go far to illustrate the need of a more generous and comprehensive spirit of criticism. For, I ask—whether among the practitioners of Gothic art, or in the charmed circle of the critics, or at an archæological meeting, or in a discourse within these reverend walls, or in the respectable reference book, or in the livelier pages of the weekly journals—this last phase of English Gothic does not meet with precisely the same cavalier and almost supercilious treatment. You know beforehand what is going to be said of it, and you know that the estimate, by whomsoever conveyed, could scarcely be cited as a model of urbanity. The criticism it receives will always be broad and sweeping towards its accounted faults, and microscopic to its slender allowance of perceived good. Now, it occurs to me that since both the attitude and language of the critics are identical, there is some reason for supposing that the censures are founded on the arbitrary assumptions of certain uniform criteria, which produce conventional criticism, whose genuineness should be suspected.

At the present moment I can call to mind but one really valuable original remark with regard to the later stages of Gothic Architecture: that of the old gentleman who,—nothing doubting that the key to perfection was in his own pocket—emphatically stated his belief that the ogee arch was invented by the devil; and, doubtless, by the same process of analysis, the still darker developments of darker times would be ascribed to the malign influences of still worse spirits!

As a student addressing other students, I feel sure that you will agree with me, that no man can be a fit exponent of work with which he is out of sympathy; and, specially is this the case when the art of bygone days is brought into question; for to nothing but love will the shadow of the past unveil her face. It seems then, that to get at the true emphasis of the work of a period, the compass of our view cannot be too broad, nor our attitude too neutral at starting. Self,—with its intrusive likes and dislikes,—must as far as possible be kept out of sight. Predilections, which of themselves are so helpful in lighting up the obscured beauties of a style to which we are naturally prone—must be forgotten as we judge of work which makes no special appeal to our sensibilities. Nor must we build up elaborate theories from the externals of a style, without realising the elementary causes of its characters. Nor should we rashly allow ourselves to ascribe to conscious motive, features and traits which may be shown to have originated in accident, and which may therefore be due to outer circumstances rather than to the designer's will.

Say, for instance, that a person is naturally attracted to 13th Century work (and a great many persons are, now-a-days). Is it necessary for the furtherance of the interests of Art, that he should on this account, forthwith and henceforth, ring repeated peals of praises over his period, and because he himself romantically believes it to be the apotheosis of all noble design, need he aggressively declare that it has the monopoly of all artistic greatness? And why?—Because he approves of the outward forms of its cusping, its arch, its mouldings, its ornament, or such inner qualities as its unaffected simplicity and vigorous purpose, or—that which is ordinarily much esteemed in a structure of this period—its chastity of lines; the self-assertive quality that maintains a naked nobility of primary thought, that needs no ornament—just as good wine needs no bush. But what do we mean when we glibly talk of 13th Century Architecture? And is it fair and rational to speak of the changing features of a transitory—and therefore imperfect—stage of Art, as though it were possible to condense and blend a century of provisional conceptions into an abstract style: when close knowledge reveals, that even decades of years are insufficient to mark the shades and intervals of its types. Nay, all the while this typical theorist is modelling his ideal, and lavishing wonder and admiration upon it, is he not strangely insensible to the fact, that the work itself cries out against his separatist notions! For do not every line and feature declare that its creator, instead of finding inward satisfaction in his work, travelled as far as he could away from each ascending development that was formed under his hand, the longer he lived and laboured; while he never reverted to the initial type in ulterior productions.

And yet another thought occurs to me on this head. As with the varying undulations of a landscape, the difference of form which greets the traveller in the stages of a journey, is usually a note of some coming difference of quality and character; so with the sweeping advances of an architectural period. Indeed, it would seem to be indispensable to the very existence of creative art, that it shall be at once pliant and progressive, ever moving onwards to an unknown goal, without haste and without rest like a star. And the moment these laws are deviated from, and the workers of a period cease to gravitate, or cease to respond to passing influences, at that moment their art falls from its purpose in the world. Nowhere is this unlimited flexibility and aptitude for progress better illustrated than in the architecture of the Middle Ages; where, strange to say, the same types and modifications of types are arrived at almost intuitively, and are reached almost simultaneously by workers scattered over a wide extent of country, who could have no direct communication with each other.

It is highly requisite then, that we should bring to the study of the formative periods of Art, a clear realisation of the defineable relationship between the thing produced, and the influences which governed its production. The effect of such a method of approach is twice blest. It elevates architectural study, enlarges its data by connecting it with the historic growth of national character, and at the same time it softens and refines the student's tone of criticism. Who, for instance that realises the relationship here indicated, could harshly or hastily condemn work which did not happen to run in the groove of his personal likings, lest he should peradventure sacrifice a whole generation of English workers and thinkers on the petty altar of his self-regarding prejudices!

If it be true that the artist in the exercise of his vocation is but the creature of his age—acting upon his age by his work, as he in turn is acted upon by it, his faculties must be not only limited by nature, but also by the horizon that surrounds him. We may, therefore, look at his productions as a reflex of his day, its religious faith, its intellectual culture, its social refinement, and its passing humour; and seeing that he is the supple agent of his generation—the cunning instrument which answers to the slightest touch of its passing moods and master influences—we may, I think, fairly assume, that so far as the impulse of his work is concerned, the artist would be just as much at home in one period of

a kindred art as in another. Or, to apply the theory to the subject now before me, the Gothic craftsmen of the 13th and the 16th Centuries—granting the affinity of their work—may be accounted as true brothers, descended lineally from the same stock, knit together by the golden cord of a common inspiration; although the conditions of their labours seem to casual eyes to remove them beyond all bounds of possible fellowship.

But more than this, such a line of thought indicates to me that the various branches of Fine Art in the Middle Ages (and it would be wearisome to go beyond this period for illustration), are one and all comparative, both as regards their inspiration and the prevailing characters of their co-existent growth; to put this more plainly, I think that the Architecture, Music, Poetry, or Painting of any phase of mediæval times are capable of being measured by the same relative standards, because I see that the same characters reign in each. And so forcibly does this relationship impress itself upon me, that I think, to have found the key to one art of a given period, is to be possessed of the clue to the interpretation of its sisters of a coeval period. All this, of course, bears incidentally on the question of consistency of tastes, and the resulting consequences of restriction on this head. To put a case: Suppose that I confine my sympathies to 13th century Architecture—or, say, to the central period of mediæval art—I, by the same token, resolutely debar my intelligence and sympathies from seeking satisfaction in any Poetry, Music, or Painting that lies out of the exclusive range of my architectural sympathies; that is to say, if I wish to be a consistent person.

Now, if the assertion as to the comparativeness of the group of arts at any given period be true, it follows that the rules which govern their composition and practice should, with certain qualifications, be also capable of comparison, and this is, I think, the case. To begin with; the generic character of English mediæval work is identical: for the Gothic inspiration, or the spirit of the Teutonic race, presides in each. Next, there is a leading distinction between all the arts of the earlier and later phases of mediæval times that cleaves to each alike; for we find that certainly in its elementary stages, mediæval art is an unconscious art, only governed by the instinctive rules of momentary inspiration; while the later stages partake more or less of the nature of all modern work, which is conscious, penetrated with thought, and carefully evolved by formal rule and method. To this I will presently return to illustrate my meaning.

Then with regard to the correspondence of the characters of the arts themselves. I believe that a bridge of mutual relationship exists between them in such matters as their rules of construction, their disposition of effects, their qualities of excellence, the sensations they evoke, and the ideas they embody.

First, let us see whether the qualities which an artist brings to his work may not be applied, and diffused uniformly, in any branch of Fine Art production, and if we find this to be the case with the individual artist, let us see whether the same deduction is not equally in force in considering the work of a whole generation of workers. A creative artist may, I suppose, be defined as an intellectual and emotional being, who creates or adorns some beautiful thought. Whatever direction his expression may take, one thing is certain, that the compass of a man's soul, the quality of his brain-power, and the cunning of his hand, are known by and in the thing expressed. But I may be told that the arts cannot be relative in this sense, because one man has capabilities for one and not for the other. I know that nature is fickle in dispensing her gifts of hand, or eye, or ear, while also the circumstances of a man's life may have robbed him of equal facilities of training even his limited stock of natural endowments. But, on the other hand, given a mighty genius of the Titanic sort, like Leonardo da Vinci, with gifts balanced all round, and a seeming equal vocation for any high art-work, we may then fairly argue that the special quality of his mental, physical, and artistic faculties will exhibit themselves

uniformly, in whatever branch of Fine Art he deals with, whether it be Architecture, Music, Poetry, or Painting. For is not the art of a man *himself*, and does it not of necessity take his inward hue and temperature, whether he expresses himself in the disposition of musical notes, or verse, or colours, or architectural lines? And if this be true of the individual, why not of the age, which is but individuals in the aggregate?

Next, as to the comparativeness of the arts themselves, in their rules of construction, their character, the sensations they express and evoke. Music, for instance, consists of melody, harmony, and discord. Melody is a series of single notes, arranged with grace, and of proportional lengths, regulated by a scale. Harmony is a coincidence of sounds that afford delight by their agreement and union; and discord is the absence of this agreeable union. It is manifest that melody is a simpler phase of Music than harmony, with its more or less intricate combinations of sounds, and being so it would in the beginnings of art be first cultivated in a separate state; and it is also apparent that it has strict limitations of power. Without going into the mythology of Music, we all know that early melody has a simple and free character, in great part owning no sway but that of æsthetic fancy, answering in this respect to the beginnings of all the arts. We are also conversant of the fact that the first wild essays of harmony seem entirely absurd to modern ears.

To seek to apply the laws and sensations of tones, as here defined, to the sister arts, seems to me no forcing of the limits of analogy. For whether we deal with the sequences and masses of colours, of mouldings, or notes, or rhymes, are not our eyes or ears sensitive to the arrangements of their structure, and to the flow of their idea, in much the same manner, just as the resulting effects are obtained by the employment of the same faculties in the composer? Our enjoyment of these effects being of course arbitrarily dependent, first upon the quality of the work, and secondly upon our insight of its beauties with a corresponding capacity for receiving delight from it. But whether the composition be one of notes, or lines of form, or verse, or tones of colours, the emotions expressed and the powers employed, may be relative and interchangeable, as is exhibited in the work of a man of balanced faculties and education. There is, then, if the theory be a right one, a distinct token of melody and of harmony in Architecture, or Poetry, or colour, as of musical sounds. And this melody consists of a series of single notes—or to put it otherwise, of one continuous line of thought or feeling, strung on a single thread, a method of composition which, though of simple scope, is not incapable of beautiful effects by way of variety, of reiterated phrase, or by caprice or episode, or by modulated tone; while to all this airy structure of light thought, harmony—which, though a distinct thing, is the greater that contains the less—brings the disposition of chords and weighted masses of sound, as is seen in the mighty symphonies of more advanced Music.

And now briefly to illustrate this theory of comparative criticism of coeval arts, by coming to closer quarters, I turn to English 13th century music, and I find rolling melodies of the Gregorian type, a trifle crude perhaps, but quaint and vigorous. Melodies that can bear to be dissociated from harmonic accompaniment just because they are “plain-song,” and in this attribute of singleness of thought, they so far bear a strict analogy to the self-sustaining lines of early Gothic architecture, that need no tricks of ornament, as this calls for no consonance of sound. But this question arises, and must be disposed of presently. Is the simplicity here indicated accidental, or is it to be ascribed to the deliberate intention of the composer? Most certainly, in this case, it must be said to be the former, because we happen to know that at the time the melody was composed and sung, music was only germinal; the proportions of time were not invented; the scale of music was imperfect; certain intervals of sound, indispensable to the practice of harmony, were not even dreamt of; and, in fact, one might almost say that even discord was not discovered. Then if I pass over an interval of three hundred years, and

again interrogate the state of music in the 16th century, I find the musician furnished with the whole mechanism of his art, with a code of general laws of harmony, an extensive scale for melody, and tables regulating time. And glancing at the style of composition then prevailing, I see the fathers of modern music busy untwisting—

“ the chains that tie
The hidden soul of harmony,”

to twist them again with a skilled hand into still subtler coils; constructing wondrous labyrinths of sound that in their gaiety or majesty bewilder, while they charm, with their “linked sweetness, long drawn out.”

Or suppose I turn to the growth of English poetry. Beginning with Chaucer in the 14th century, I find in his verse fair thoughts, and bright imaginings, expressed in unaffected fashion, strung together in measures that are encumbered only by the unconscious rules of artistic instinct. Simple narrative, or pictorial effect, idyllic details taken straight from Nature, and a native genius for musical cadences, being all the instruments the poet needs to ply his craft. The thinnest link of thought connects his efforts, but he makes up for the want of richness and depth, by his simple hold on Nature. No one dreams of disparaging early English poetry, and least of all should we, in these days of fevered work and morbid sentiment. For do not the lisplings of early art come to us like a breath of spring, with a charm of birds in the air, a sense of budding hedgerows about us, and at our feet an—

“ Embrouded mede
Alle ful of freshe flowers, white and rede !”

Yet for all the melodious grace and springtide beauty here depicted, even the seasons in their courses remind us that redundancy and splendour find equal place in Nature's economy, as I desire to prove their equal right of place in Art. So we pass on again to the 16th century for a picture of a more variegated age, and see Spenser, Marlowe, and others building the lofty rhyme, spending much force in the formation of language, that has increased in richness and volume, in proportion to the richer and more varied thought of which it is the medium.

And to apply the same mode of analysis to the earlier and later phases of mediæval architecture, let us take one point specially connected with our subject—that of sculptural decoration and its adaptation to buildings. And, since Nature is the food of all Gothic art, let us briefly see the distinctions between the workman's dealings with natural objects in these and the intervening times.

Judging from the work produced, the English sculptor, in the early days of Gothic, seems to have looked at the goings-on of the great world about him, very much as a child does, with a casual eye: content with the sense of her joyous presence: wondering, perhaps, at her beauty, yet scarce stopping to concentrate his attention upon any feature in particular, and never attempting to present that which he saw except suggestively, and in a conventional fashion. So in Norman days, chevrons and frets pass for clouds or sea-waves; a trellis of lozenge-mouldings do duty for the interlacings of the branches of trees; cable and chain mouldings indicate the scope of the carver's impressions of inanimate objects; and cat's-head and bird's-head devices, infinitely prolonged, is the sum of his observation of the animal creation. In “early-English” days comes the dog-tooth and the ball-flower ornaments, set in deep-cut mouldings, with bossy foliage to capitals, and bands of meandering leafage, the innate purity of whose line saves us from getting tired of reiterated patterns, just as the cadences of a pure melody sweetly sung never weary us. Later on still, sculpture, in its higher and lower flights, groups itself among the lines of constructive form, and there is seen a greater variety of range, more play of fancy, and more delicacy of hand. Till at length we are landed in the period under notice, where Art, having

achieved ornate constructional forms, takes an entirely pictorial and realistic aspect; and with increased gorgeousness of effect, blends her richest sculptures of rose, or pomegranate, or vine branches with subjects gleaned from the homely drama of every-day life; gaining in this passage of her history a character at once more graphic, naturalesque, and humane.

It is sufficient for my purpose to have thus rapidly passed these three Arts in review, if I have made my meaning clear; and that which I have tried to make clear is, that each age improvises for its own needs, and affords its own clue to those accidental characters which we, according to our differing tastes, find of grace or defect in its productions. And I would further have it observed, that in all coeval arts a kindred likeness of characters is to be detected. In each case the elementary stages show work that attains beauty of a limited range; its workers being men who vibrate to the influences of simple thoughts and ways, and humours, and an unquestioned religious faith. While to the work and workers of the latter phases of art, has descended the curse or glory of contention with an entirely opposite set of conditions; with newly-awakened sensibilities of intellect, of fancy, of mood, of fastidious tastes, and the disturbed elements of a precarious religious faith.

If I wanted to learn Gothic art, I should begin at its simpler phases, just as I should go to the initial stages of English poetry to learn the roots of my mother-tongue. But I should endeavour to keep my powers of judgment and perception straight, and my sympathies so far disentangled, that I did not get them hopelessly embayed in a period where there was no outlet that I cared to use.

The three central charges made against the advanced period of Gothic architecture with which we are now concerned are, that its structures betray inert purpose, effete thought, and such a use or misuse of ornament as led its designers to rely solely on the exuberance of its enrichments for their effects. As my purpose is to analyse the Art of the 16th century, and not to apologise for it, I am not going to deny the impeachments, but to endeavour to see how far they are true.

The whole of these charges can of course only be met face to face with the productions of the period, but it seems to me that the first and second—namely, those of inert purpose and effete thought—reflect more upon the era which produced this work, than upon the art itself. First, then, of the spirit of the time, and the mutual reaction of the age and the art upon each other. We find ourselves launched upon an epoch in which two important movements are in progress, not altogether dissimilar in their impulse, although outwardly disconnected in their agencies. An artistic and literary revolution known as the “Renaissance,” which had its generation in Italy; and a religious revolution which had Germany for its head quarters. England, as we know, is not exactly apt at adopting new ways of thought or action. Yet in those active, swift-minded days, there was change in the air, and it was not possible for one nation long to hang back where others had eagerly assimilated one or other phases of these movements. Their emissaries were among us, sowing seeds of discontent at the old order of things, and drawing on their imaginations for a picture of better results under other auspices. Revolutions are out of the strict order of events, and they have a way of utterly disconcerting and upsetting the natural bearings of the things to which they relate. Thus, when the influences first made themselves felt on English soil, there crept over men’s minds a strange lethargy of temper, that is only to be accounted for as the result of a staggering blow at the foundations of old and loved traditions, when everything is shaken and in question, and the future seems wrapt in uncertainty.

The time we are dealing with, then, stands forth in history as a sort of brief breathing space; a period of tranquility strangely at variance with the burst of energy that preceded it, as with that which followed it when things had found their level again. To some workers of Gothic art it became a time of unresisted languor, but not so to others.

They who gave up things for lost, pass before us out of the distance of time, like rowers on a

river, spell-bound by a sudden catastrophe, who, with no inducement to put forth their muscles, cease "the languid pulses of the oar," take refuge in such pleasure as comes in their way, and let the stream carry them whither it lists. But wherever the foreign invasions are either combated or calmly ignored, we light on an aspect of affairs that has much of pathos to me. For out of the dim haze of three and a half centuries may be seen men of heroic mould, struggling for the life of their ancestral heritage against the full tide of a double invasion; who, in that struggle, not only held their own against great odds, but lifted their art and themselves to heights of skill and range unknown before. And the structures raised by their faithful hands show to me none of the mild decline of a decrepit old age. I know that it was different with the contemporary works of France and Germany, whose designers could somehow stand still at a certain point, but here is none of the doggrel or mechanical ornament that implies decay. Here I detect neither vague ardour nor commonplace design, neither do I see upon the face of this style the jaded look that comes of inane wanderings to the mangled remains of miscellaneous styles—that sure mark of an impure and an emasculated art.

The workmen, too, call for my sympathy, because they appear to me as men, blameless of the apostasy usually ascribed to them, in that they were but the victims of that strange providence, that with something of iron destiny puts down one order to set up another,

"Lest one good custom should corrupt the world."

And more than this, the laurels these men won by their work were never worn by them; for the new-fangled Renaissance robbed them of all contemporary notice, and the world since their time has always had some excellent reason for continuing to ignore their labours. If such art as this be indeed "effete" and purposeless, the men who handled it had a faculty for imparting to their work a most singular strength, and I, for one, am proud to render them my sincerest homage.

With regard to the third charge, of overdone ornament, it will be well to make a few remarks. We have just seen that a degree of spiritual beauty may exist in both the simpler and the more ornate phases of art, yet everyone will grant that art is in most peril, when most susceptible of embellishment, or to put it in Shakspeare's words—

"Ornament is but the guiled shore
"To a most dangerous sea."

Still, this does not say that there is no such thing as legitimate ornament, or even a legitimate magnificence of ornamentation; yet we must be willing to admit that the defence of the period under review, rests on the proof that the proper bounds of ornamentation have not here been overstepped. We will assume that a fine art composition consists of two parts—its structural thought or primary purpose, and the artistic expression in which it is arrayed. Most frequently these parts have no real relation to one another—as, for instance, the grouped cylinders of Early English architecture have no real relation to construction whatsoever*; "but in fact contend with it, and deny the construction, their principal purpose seeming to be the concealment of the joints of the voussoirs." On the face of it, it is quite conceivable that both the structural thought and the artistic expression are, separate or combined, liable to abuse, according to the fluctuations of taste. But it cannot be otherwise than that the highest art should be that which unites the highest qualities of both thought and expression. Early work has been described by Mr. Ruskin as bearing more or less the character of a good solid wall with irregular holes in it, well carved where there was room. This sounds like simplicity and

* See Mr. Ruskin's "Slade Lectures" for 1870, pp. 21—2t2. ("Arara Pentelici.")

goodness itself! But, as I have already said, there are two kinds of simplicity,—one is that of schooled restraint, and the other is that which springs of artlessness or impotence; and if my remarks as to the comparativeness of co-eval arts be tenable, I shall have proved that the simplicity of early work answers to the latter description and not to the former. In saying this, I draw no inference as to the varying excellence of either sort, the remark being called forth by a simple desire to demonstrate the issues between the earlier and later phases of English Gothic work. For when we examine 16th century work we find that, unlike the unequal past, it summons to its aid every secret of the artist's craft, and every power of his hand and brain. Let us see, then, whether the art is therefore necessarily bad and false. And, first, we must enquire as to the nature of legitimate magnificence, and wherein it differs from that which is not good. The simple answer to this is that legitimate magnificence is that kind of embellishment which, being applied to a noble thought, will enhance its beauty without obscuring its essential purpose. It will be seen that I assume the subject of this ornamentation to be of itself noble and worthy, and we might go on to say that a noble structural thought leans least on its ornamentation, because it feels the dignity of its own innate beauty.

The peril of a susceptibility to redundant magnificence has already been enlarged upon; indeed, we know that magnificence may at any moment become mere display, and from display drift onwards to grossness, or to its opposite vice of soulless elegance that dies out in the Dutch modesty of aim of a starved precision. But it is, I contend, both possible and good to unite a gorgeously coloured diction to noble thought, as it is right and possible to wed forceful lines in architecture to a studied magnificence of style, and—to seek a literary simile—it is only when word-painting becomes so florid that it obscures thought by pointless conceits; when diction and style are followed as the end, instead of the means, that we may consider ourselves fallen upon evil days.

But, in truth, another law—not often sufficiently recognised in the consideration of periods like this—comes in to explain in great part the nature of the art-production at this time. For it will be seen in whatever sphere of associated labour we interrogate, whether of the Fine Arts, scientific research, or mechanical invention; a period of great creative effort is invariably succeeded by an accumulative period. As it is said of Nature, when “the whole earth is at rest and is quiet they break forth into singing.” So now we find ourselves in a carnival of Art, and the artist comes laden with the spoils of the past, ready to enrich them with his own toil till Fate, or the “ever-whirling wheel of change,” shall end his labours and involve his art and himself in like oblivion.

Briefly, the resources of the accumulative phase of art now before us are these. Carefully considered structural effects; the admixture of architectural mouldings with fanciful sculpture; great constructive science, exhibited in balanced masonry of fretted roof, or internal or external supports; delicate execution of free-hand carving; sculpture in niches and canopies, traceried wall-surfaces, parapets and buttresses, and wherever there is room. All these scientific and artistic embellishments does the Gothic artist of the 16th century bring to harmonize with the constructive necessities of the building under his hand, and therewith grace the last crowning efforts of his ancestral art.

But I may be told that the art here described is a very secular thing, that the rudder of Gothic Architecture always was, and always should be religion; that early art, instead of aiming simply at pleasing the eye, tried to raise and solemnize man's affections through the things it portrayed. Be that as it may, the age must account for this phase of character; and I am not aware that in the days now in question, either priest or poet, architect or painter, were conspicuous for the depth of their religious convictions, or for the purity of their moral life. Nevertheless, be it said, that theology, or

music, or architectural style, is not necessarily tainted because bad men have handled them in times past. And anyhow, the work under review is thoroughly characteristic of our national genius; it is historic; it bears the mark of a self-sustaining life; its creations have an independent and a relative value, and they are good, in that they are pleasant, profitable, and honest. Though not devotional, the work is earnest and serious, like even the most fanciful English work of that day; and what it lost in ascetic spirit, it gained in increased graphic power and naturalesque treatment. Its human interest is also enhanced by playful renderings of home-life and home-pursuits, personal badges, emblems of trade and industry, or fanciful rebus, while it is by no means negligent of the higher region of figure sculpture, nor forgetful of brute and flower.

Contrast is one of the most forcible agencies for realising character; and I will set side by side a bit of French work and a bit of English work, both dating from the early years of the 16th century, (the French nearly ten years earlier than the other,) and in a trice you will see the distinction between them; and why I say that English work of this period was not wholly depraved in spirit and aim.

First are the carvings on the tomb of a French Cardinal-Bishop—date about 1510—which comprise the following objects,—the sphinx, the cock, and the dragon of Minerva; arabesques; griffins; birds; dolphins; winged lions; and winged boys with bows and arrows, or flambeaux and cornucopia, and boys holding skulls or blowing horns; ox-skulls; a faun; a sphinx; a monkey which a little boy holds by a chain, whip in hand; a lamb; dogs' heads; winged bulls; and a centaur with a cowed monk's head.

On the other hand are the carvings on the roof, and the stone wall plates of a porch to an English Church, built by a cloth merchant. Here are bales of goods marked with the merchant's name or cypher; a ship at sea; dragons; dolphins; fish; a sheep with a bell round its neck; a bird settled on a cow's back, holding on by its ear; a gridiron; a dove; a sheep scrunching a turnip; a cat playing with a monkey; a dog bearing a shield; an anchor; coils of ropes; bunches of fruit, and sprays of foliage.

This insight into the aim of English work just before the decease of Gothic, makes no mention of the more ambitious efforts at figure sculpture which also exist; and whatever opinion we may entertain as to the quality of this work, we must admit, that at the decline of Gothic, native English workmen ceased to produce any high quality of figure sculpture worth looking at.

Let it not be said in the words of Shakespeare that this "gracious voice obscures the show of evil;" that it is assumed virtue "hiding the grossness with fair ornament; because I fail to see the corruption of the stock on which these fair features are engrafted, and it rests on those who make the assertion to prove that the enrichments are applied to conceal defects, and not to enhance beauty. And all the while one is canvassing its characters, one feels that the death-knell of Gothic Art is being tolled, even as

"fancy dies
In the cradle where it lies."

But the last passage of its life is clearly not that of a poor imbecile thing dying of inanition; nor is it destitute of the elements of grandeur and pathos. Though old with the weight of years, it revolves memories of a glorious past, and fights gallantly to the last for a place in English hearts. And gathering all its forces together—uniting skilled and elaborate architectural form to the splendid harmonies of colour and sculpture,—it is only put to silence as the last ray of mediævalism fades from English soil.

To illustrate my remarks upon 16th Century Gothic, I ought, perhaps, to have gone to the

larger edifices of the period. These are few enough in number, for it was a time of disintegration and the men of the period were not much inclined to large buildings of any kind. My purpose will however, be sufficiently served if I take a few typical examples of a class of erections that is specially connected with this era,—that of Chantry Chapels, erected as separate structures, for the tombs of great men, and the place of tombs is an apposite one wherein to read the last page of the annals of Mediæval Gothic Architecture. Thus we find, that the first stone of Henry VII.'s Chapel at Westminster, was laid in 1503. One year later the Chapel for Prince Arthur's tomb, was erected in Worcester Cathedral. About the same time was built Bishop Alcock's Chapel, at Ely, and a host of others followed, too numerous to mention in detail. The name of Chantry Chapels arises from the fact that they were chapels endowed with a yearly revenue for the maintenance of one or more priests to say or chaunt mass for the souls of the donors and others named by them, and they owe their origin to the faith of the Christian church in the efficacy of intercessions for the departed as well as for the living. The purport of these chapels is illustrated in the following clause of Bishop West's will relative to, his monument in Ely Cathedral, erected in 1534,—“To be buried in my Cathedral Church of Ely, in “the middle of a chapel by me newly erected, on the south side the chapel, and a convenient stone of “marble to be laid upon me, with this writing only :—‘Of your charitie pray for the soule of Nicholas “West Bishop of this see, and for all Christian soules; for the whiche prayer he hath graunted to “every persone so doying, fourty daies pardon for every tyme that they shall so pray.’”

It will be seen, that my subject embraces a large and most interesting field of study, but the law of dimensions compels me to restrict myself to a few examples. I have therefore, selected as my theme, three typical buildings for illustration situated within a circuit of twelve miles, built within an interval of nine years, and, as I can prove by internal evidence, by the same hands.

I now ask you to accompany me to Devonshire, the land of orchards and rich pastures, red earth and oxen, for the three examples to which I have referred. These are, the Greenway Chantry at Tiverton, date 1517; the Speke Chantry in Exeter Cathedral, date about 1520; and the Lane Chantry at Collumpton, date 1528.

John Greenway who erected the chapel at Tiverton, was one of a band of thriving merchants who profited by the extensive woollen factories of the town, and the whole locality was famous for its manufactures throughout mediæval times. He is described by Blundell as of very mean parentage, yet by the blessing of God, and a diligent hand, he grew vastly rich. His particular employment at last was buying wool in Ireland, and transporting it into England, which returned him a vast increase, a considerable part whereof, if not the whole, he laid out in works of piety and charity. Dunsford, another historian, both more moral and modern, says,—“Mr. Greenwaye, by some of his inscriptions and the tenour of his will, seems to have been strongly impressed with a dread of a future state of purgatory, the profitable shop of the Romish priesthood; and to have been influenced by the hope of escaping the fabricated horrors of that place, and of winning heaven, to bestow for the purposes described, his well-earned fortune, like many others in those superstitious times.” Yet the worthy biographer perhaps somewhat inconsistently caps the remark by adding that after all, Greenwaye seems to have had just notions of human life, and was actuated in his public benefactions by genuine piety and disinterested benenevolence.


According to his will, I find that provision is made that “there may be some yerely obiit kept in the said Church of Tiverton, with five priests to sing or say five masses on the nyneth day of February, for the soule of me, my wife, our fathers and mothers, and for all our friendes.”

Besides erecting his own mortuary chapel before his death, which occurred in 1529, he rebuilt the nave arcade of the Parish Church, the whole south front, and the “Great Porch.” He also erected in

the town a chapel and almshouse for poor men in Gold Street, on which runs this quaint inscription, "Have grace ye men and ever pray, for the soules of John and Joan Greenwaye."

The mortuary chapel to which I now call attention, lies on the south side of the Church. Before us is a structure, striking both in the originality and thoughtfulness of its composition, and the lavish skill of its sculptured face; for from the springing line of the windows to its crowning parapets scarce any space is left unadorned. The main façade shows two bays with an unequal Eastern corner brought forward to take the recessed tomb on the east front.

The structure is divided by buttresses, carried from the ground and terminating in finials above the parapets. Horizontally, the building has plinths, frieze, strongly defined string courses, and panelled work between the corbel table and the parapets, and it is striking to observe that although the horizontal and vertical lines of the buttresses contend for pre-eminence throughout the design, the eye is interested and not disturbed by the effect produced. The windows, which are four-centred, are graphically described by a local historian as "neat, but of a debased stile of architecture, approaching that observed in the Tudor school;" and the same critic goes on to say that the "Church tower is a most beautiful and classic building of decorated architecture." The spandrels above the windows are occupied by flowing lines of tracery, filled with anchors wrought in low relief. Above this is a peculiarly interesting sculptured band of frieze, representing the merchant's vessels riding at sea, a large ship in the centre of each compartment attended by a smaller boat on each side, manned with rowers; the sea being represented by a succession of deeply-cut wavy lines, the ground of the whole being the plain face of the wall. Over the frieze is the corbelling to the parapet, which consists of a deep string course, on the face of which occur subjects from the life of our Lord, twenty-one in number, set at intervals, but the figures are so small that it is hard to make out the subjects from the ground. Between these subjects are carved sprays of foliage, anchors, sheaves of corn, bunches of grapes, the instruments of our Lord's Passion, and bales of goods; rather a miscellaneous selection, but without being consciously irreverent, it was the way of our fathers thus to play with cross-lights as it were, and to mix religion with their common life, for Puritan correctness was not then invented. Above the frieze is the parapet with its sculptured panels, containing griffins or angels holding shields bearing Greenwaye's, the merchant adventurers' and the Draper's Arms. The parapet is battlemented, of three steps, pierced with open cusplings, in the centre of which are grotesques, flowers, or shields.

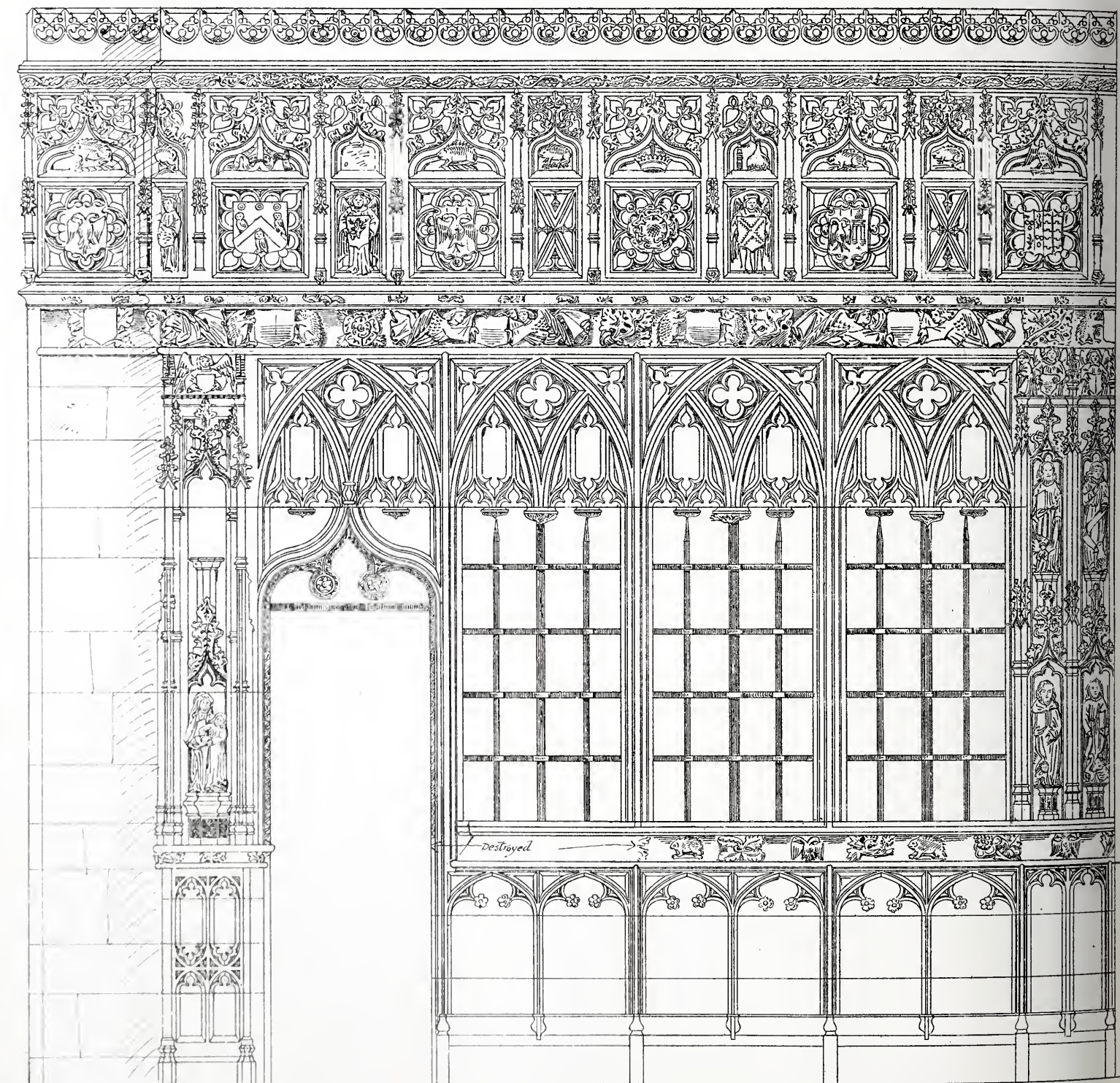
The buttresses are of three stages, the weatherings being heavily moulded, and carrying grotesque animals; the buttresses are panelled in front, and enriched with carving. The upper stages of these each contain a sitting figure of a man who is evidently intended for the same person throughout. In one case he is pointing to a book open upon his knees; in the second case he holds a scroll, and in the third case—the one I have sketched—he is reading a book. The face of the other stages of these buttresses is adorned with cusped panels with anchors and bales of goods, with ships at sea, and shields bearing the initials of the founder. These devices are also carried round the south aisle, which, as we have noticed, was built by Greenwaye. Numerous scrolls occur also about the structure containing such legends as "God sped  " or "Lord grant to John Grenway good future grace, in heven a place." Over his tomb

"Whilst we think well, and think t'amend,
Time passeth away, and death's the end;"

and an angel carries a scroll bearing the legend—"Of y^r charitie pray for the soul of John Greenway and wyfe." Another runs—"In time and space GOD send grace."

The porch contains much interesting work. It will be seen from my sketch that the composition

ENGLISH GOTHIC IN THE SIXTEENTH CENTURY.



∞ The SPEKE CHAUNTRY · EXETER · Cath^l · Elevation of Screen · Measured and drawn by J. D. Sedding. ✓

0 1 2 3 4 5 6 7 8 9 10 feet.

is exceedingly good, being easy in its design, and original. A large two-centred arch spans the entrance, which is flanked by canopied recesses for figures, and the broad niche above the arch is interesting, not only because of the clever way in which the cross is made to grow out of the hood-moulding, but also because we have in this and in a niche over the inner doorway, some of the earliest bits of English Renaissance.

The central niche, and the smaller side niches contain coats of arms. The roof of this porch, as of the Greenway Chapel, is a waggon vault of stone, of four-centered shape, elaborately panelled. The porch roof has as many as 81 traceried panels, each bearing a differently sculptured device in the centre. The carving to the wall plates and roof of this porch I have described a few pages back, and it would, I think, be difficult to name another example of mediæval work of the same dimensions, in which a greater amount of creative thought and quaint humour is displayed.

The roof of the Greenway Chapel is also panelled, but with large circular medallions, elaborately cusped and carved, and ornamented with pendants. I have already noticed the bits of Renaissance ornament on the shafts, &c. of the niches in the porch. The niche to the inner arch contains a well-depicted carving of the Assumption of the Blessed Virgin. A further instance of the Renaissance influence is afforded in the door of the entrance to the Greenway Chantry, which is separate from the Church, occurring on the east side of the porch. The arch is four-centered, and deep moulding encloses the door, running down to the step, and finishing there with a base. The door is divided into four parts; the head, which has three panels, divided by ribs with cusped arches; then a narrow horizontal panel, on which is a flowing scroll. Then below this, three pilasters, having arabesques upon them, as also on the space between them; and at the bottom, another horizontal panel, also bearing arabesques. Mr. Penrose, in a lecture he gave some time ago in another place, ascribed this work to French influence; and there are incidental bits of detail of peculiarly French character, which lead me entirely to concur with him in this opinion. It may at first sight seem strange that a breath of Renaissance should at so early a period reach a small town of Devonshire, were it not that local histories record the arrival of foreign weavers and merchants at this or the neighbouring towns.

My next example is that of Speke's Chantry at Exeter Cathedral,—date about 1520. This—otherwise called the Chapel of St. George—is built between two of the large buttresses on the north side of the choir, and a twin chapel built for Bishop Ouldham's tomb in 1525 exists on the opposite side of the choir, whose details and general design plainly declare that the same hands have been employed in the construction of each.

The main façade of the Chantry consists of three parts—the plinth, the open screen, and the cornice. It will be observed that the same contention of horizontal and vertical lines is brought into play here, as in the façade of the Greenway Chapel just noticed, and with like happy result. The plinth is divided into panels by means of moulded ribs, and the cusping to the heads of the panels, as in some early work, dies on the soffit of the ribs. The cornice to the plinth is enriched with carving that represents the porcupine, the crest of Sir John Speke the founder, spread eagles, and bunches of fruit and foliage; the corresponding cornice on the other side of the screen, having representations of a porcupine playing with a hare, and a sculpture showing a fox's head growing out of the back of a man's head; evidently a 'morality.' Above this is the open screen, consisting of two-centred arches, filled with cusping, the mouldings of which are *woody* in their minuteness and delicacy. Flanking the four bays of the open screen are piers elaborately enriched with recessed niches, filled with figures of saints. On the right hand are the four Evangelists, with their symbols, and on the left, the figure of the Blessed Virgin and her mother, the Virgin pointing to a passage in an open book held by St. Anne; and on the west face of this pier is the Assumption of the Virgin, who is borne upwards by an angel at her feet

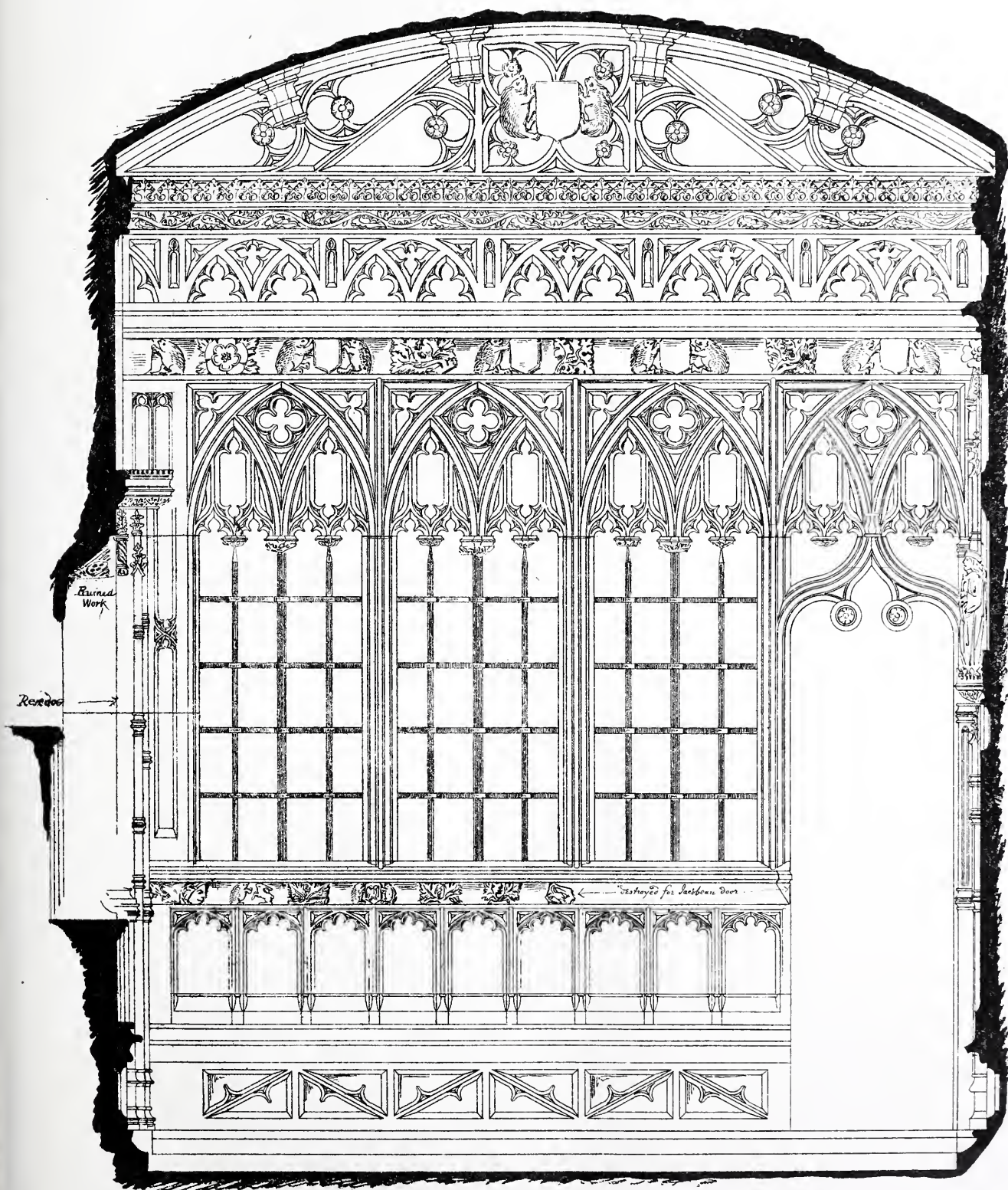
and one on either side. Perhaps the best definition of the upper part of the screen is that of a deep frieze, with brattishing work at the top, and a cornice just above the arches. The body of the frieze is occupied by pannelled recesses filled with coats of arms or angels bearing coats of arms. Heraldry, linked to chivalry, had throughout the Middle Ages given many decorations to architecture in panels and spandrels, but there is something of the parade of heraldry in the phase of social life of which we here catch a glimpse. Not content with giving the founder's arms, a sort of Mutual Admiration Society is formed, and by way of compliment, all the arms of the notables of the neighbourhood load the structure, both here and in the interior faces of the Chapel walls; a feature which also finds a place in the beautifully carved capitals of the 16th century nave arcade at Tiverton Church, where are the coats of arms of numerous magnates connected with the Courtenays, who were lords of the manor of Tiverton.

The cornice is formed of a wide hollow, which has figures of angels holding shields, and between them are large roses or sprigs of foliage, coats of arms, and in one case a hand grasping some foliage. Just above is another small hollow with some curious enrichments, where I found sculptured representations of a defunct woodcock, with a brace of trout lying close by, a porcupine devouring a lizard, a bat with wide-spread wings, a sheep, and sprays of foliage; but so minutely and delicately done that a child's hand might cover each subject.

The angel figures in the large hollow moulding have flexible bodies neatly accommodated to their straitened positions, and dresses that are swayed into sweeping folds, each line of drapery, and figure, and wings having its harmonic relation to the rest. The angels have the long, melancholy Saxon face, not beautiful, but dignified, and English, and characteristic of all the later phases of English Gothic.

The chapel is 12 feet 6 inches long by 9 feet wide, and about 16 feet to the crown of the vault. The vault is of the cradle form, constructed out of the segment of a circle and pannelled with circular medallions like the Greenway Chapel. A five-light window occurs on the north side, and a reredos—evidently of beautiful workmanship—did of old exist at the east end; but this is now destroyed. The reredos in the twin chapel of Bishop Ouldham affords us, however, a good idea of its original character. Under the window is the tomb of Sir John Speke, the founder. Each face of the wall shows a redundant power of design and play of fancy. The "poetry of tracery," to borrow a phrase from Mr. Fergusson, is here called into dexterous play in fretted roof and tabernacled niche and pannelled wall-surfaces; but—to use a valuable remark from the same accomplished author, "The English always worked within their strength, instead of going to the verge of it like the French."

My last example is that of the Lane Chantry at Collumpton Church, built by John Lane, a native merchant of that place. There are many points of interest connected with Collumpton Church which I cannot stop to dilate upon, and I pass straight to the Lane Chantry, which forms a second, outer aisle to the south side of the church. This aisle is 57 feet 4 inches long, by 15 feet 9 inches wide, and has an arcade of five bays opening into the Church, and a corresponding number of windows in the outer wall. These windows have two-centred arches filled with four lights, the east window being the same as the other ones, and the west window having six lights. The piers supporting the arcade show buttresses towards the Church. These buttresses are divided into four stages above the plinth, and are pannelled with recessed niches on the three exposed sides. The two lower stages bear figures of men carrying scrolls. The carving of these figures is highly characteristic, and the student of costume would find in them plenty of material for interest; and from the manifest effort at likeness, I take them to represent—in modern parlance—the *employés* of Master John Lane. Some wear tunics,



Inside Elevation of Screen . J. D. Sedding & E. E. Boisjier. Del^{ts}

10 8 0 7 6 5 4 3 2 1 0 feet

some capes or cloaks, and some have turbans on their heads, others the artizan's cap, and the Tudor slouch cap. The roof is another noteworthy feature. It is of stone, but unlike the other examples, it has fan vaulting with pendent keystones, the fans being ribbed with larger and subsidiary ribs. The pendent bosses at the intersections are carved to represent angels bearing instruments used in the manufacture of cloth. The angels which occur to the corbels supporting the groining bear like devices, or in some cases the instruments of our Lord's Passion.

The exterior of the Chapel is also interesting. Between the windows are boldly projected buttresses, and underneath the windows, cut in the face of the stone, is a continuous legend relating to the erection and the purpose of the Chantry. The weatherings to the lower stages of the buttresses have grotesques, and the upper weatherings show pedestals for large figures, now destroyed. The general design and details are exactly like those of the Tiverton work, and, like them, the face of the buttresses is enriched with square or quatrefoil panels elaborately carved with strange devices, such as Master John Lane's initials associated with an anchor, the ships he had at sea, his staple marks and cyphers, and the implements used in cloth manufacture. These and the sculpture of the corbelling to the parapet, the quaint grotesques to the buttresses or window labels, and the figures in the interior of the Chapel are each and all rendered with true Gothic fire and originality, eloquently declaring that the native gifts of fancy and power of hand of the men of Devon,—and they were ever a great carving race—had descended upon a worthy offspring who could nobly sustain these gifts to the last. As I have before intimated, work like this is fresh and spontaneous, in spite of its refined character. For the English artist of those days, like his progenitors of earlier time, held to Nature as his main-spring. He got not only as much, but even more, delight and content out of the hedgerows and the flowers and beasts of the field than they, and also much more out of the familiar incidents of common life. The provinces of their labour differed, as I have said (1) because Gothic Art was elastic, and therefore admitted of accessory characters; and (2) because the children of different epochs needed their own special mode of expression.

And wherein did the distinctions lie between the dealings with nature of the early and late phases of mediæval art? Mainly, I take it, that the early schools came to nature timidly, and with a child-like simplicity, while the later schools treated her with familiarity. And it seems to me that these diverse attitudes are explainable by the light of the varying degrees of culture of the artist's times, and the changed requirements of art. The early sculptor learnt humble lessons of her, because his limited perceptions kept him unconscious of the extent of her capabilities for art purposes. On the other hand, the familiarity apparent in late work, speaks of a closer identification of man with nature. Hence the individualism of the workman and the naturalism of his art. The inauguration of an elaborate style, enriched by graphic and picturesque sculpture, being the result of a fastidious taste that called for the greatest excellence that could be had, and demanded a display of the studied effects of a conscious art.

So we may look at this epoch as a sort of middle-stage between early art and the art of to-day: neither quite ancient nor quite modern; neither quite conventional nor ideal; and, just because of its complex character—getting small favour from the style that immediately succeeded it, or from the revived Gothic of the present time.

I have called this epoch the middle-stage of English Art; and as the horizon is lifted, we get a glimpse into the character of the art that is to succeed it. From that period to the present, the ever-increasing identification of man with nature has been slowly but surely going on; and in our day the same old enthusiasm has found a new channel of expression, and has emerged into still fuller light through the works of Landseer and Turner.

But it is not simple nature that these men deal with ; it is nature spiritualized by man's imagination, exalted by an indescribable charm of poetical emotion till,—in contemplating Landseer's pathetic tragedies and comedies of brute beasts : or the landscapes of Turner, transfused by his exquisite imagination,—the spectator is puzzled to know whether the spirit of the things pictured has passed into the artist's brain, or whether the man himself has been absorbed into them.

Yet in truth these men, as they passed to their triumphs, did but unconsciously catch up the links of old English Art of the far-off times, to complete the arrested work of the great unremembered dead of earlier days, with whom they now rest from their labours. For Ideal Art must first have had its phase of naturalism, as naturalism is preceded by conventionalism.

If I have failed to establish the underlying connection and pervading identity of the earlier and later chapters of English Art—that unity which Mr. Ruskin is ever seeking to enforce—I shall have failed in the purpose of this somewhat rambling dissertation. But however this may be, I have the satisfaction of feeling that the more fields of inquiry opened out to the student, the broader will his horizon become, and the more chance is there for discovering the varying aptitudes of many active minds among us.

At the conclusion of Mr. Sedding's Paper a vote of thanks was unanimously passed to the author.

In consequence of the time occupied by the Special General Meeting, which preceded the Ordinary one, the discussion of the Paper was unavoidably postponed.

Royal Institute of British Architects.

At an Ordinary General Meeting of the Institute, held on Monday the 27th of March, 1876,
SIR GILBERT SCOTT, President, in the Chair, the following Paper was read :—

BIOGRAPHICAL NOTICES OF DECEASED FOREIGN MEMBERS.

By FRED. P. COCKERELL, Hon. Secretary.

IN fulfilling a portion of the task which I have undertaken of laying before you—Sketches of the Lives of some of our deceased foreign colleagues—I have met with considerable difficulty and experienced considerable pleasure. The difficulty has consisted less in searching out the materials in the several professional journals, and in sifting from the materials so found the matter of substantial interest, than in searching in vain for materials which have not been forthcoming. A further difficulty presents itself, which I do not undertake to overcome, namely, that of preparing memoirs of those of our deceased members who were not French. I cannot read German, and I know of no source from which I could readily obtain the materials for memoirs of our Italian colleagues. My task, though I hope to continue it, must therefore remain incomplete. The pleasure which I have derived from the study of those lives, which I have now to bring before you, consists in the contemplation of the high qualities of the subjects of them. I find in a remarkable degree in the lives of these French artists a quality, which, if it is not peculiar to the French as a nation, is at least one of their very marked characteristics, and has shown itself in other walks besides intellectual ones: in war, in missionary enterprise, and in the relations of the affections. I mean a certain chivalry and self-sacrifice, which in its various spheres of action amounts frequently to heroism.

In the subjects now under consideration, I find a high ideal involving a high ambition, pursued with a singleness of aim and an untiring energy and devotion which is quite unsullied with any taint of greed. The early ambition of these men, whether they are born to ease or to toil, is not to rush into practice and to secure commissions, but to distinguish themselves in the schools and to gain its honours and their crown—the Grand Prix. At Rome they live a life of anything but luxury, and spend five years in study without a thought of the five per cents. which are passing into the pockets of those at home. When they achieve professional success, their ideal is not to multiply jobs, but to carry out with conscientious perseverance some one or very few works. When we consider the time occupied in one of the great public works, and learn that their authors have scarcely any others simultaneously, we may judge how great is the sacrifice which they make of comfort and luxury to the attainment of perfection. These lives may indeed put us to the blush, and I cannot but feel with humiliation how great is our need of the study of them. I shall give on this occasion only three lives, but these are of representative men and constitute the cream of the subject.

FELIX DUBAN, one of a group of illustrious contemporaries, who have exercised a large influence upon the Great French School of this century, was born in 1797, in a very modest sphere of society. He received a liberal education at the Lycée Napoleon which he left at the age of 16. It does not

appear what were his early proclivities or for what career he had been destined by his parents, but the marriage of his sister with M. Debret, an architect of talent, and afterwards a member of the Académie des Beaux Arts, determined the course of his studies and fortunately cast the seed of his talent in congenial ground. He entered on leaving school the atelier of his brother-in-law, and followed the courses of the École des Beaux Arts, where he took part in various competitions with, apparently, but indifferent success, as I do not find it recorded that he carried off any important prizes. His designs, however, were marked by a great individuality, and by an originality of conception, which though they may have foreshadowed the fertility of invention that was subsequently to shed so great a lustre on his name and on his school, probably marred his success with judges educated in the severe School of the Empire, and chilled and formalised by the primness of a period when the accomplished correctness of the Perciers, the Achille Leclères, and the Caristies, which had flourished under the pseudo heroic splendours of the Revolution and the Empire had faded away, and given place to the dull scholasticism which marks that most disastrous period of art—the Restoration, when the classical studies of Leroy in France, and of Stewart and Revett and their successors in England were in abeyance, and those of Huyot in Asia Minor were as yet scarcely known; a period when eclecticism had begun to unsettle traditions, but had not yet produced the research which has subsequently palliated its intrinsic fault, if it has not justified its principle.

Of the ten years, during which Dubán followed the schools, I find no precise record. In 1823, however, at the age of 26, he gained the Grand Prix de Rome, and escaping from the cold shade of formalism, and the trammels of cut and dried programmes, plunged into the free air and glowing warmth of the arts of ages, in their cradle, Rome.

Here he could indulge without restraint in the feast of beauty, which was not the less a feast for being pursued with an energy and ardour which absorbed all his faculties, and which, far from ministering to sensuous enjoyment of the external only, begot in him a desire to seek out the very springs from which it was derived, and laid the foundation of that deep appreciation of the living principles of art, which enabled him to revolutionise the style of his period and to set a stamp upon his school, which, it is hoped it may take long to efface. His first year was mainly spent in taking off the edge of his appetite by an eager absorption of all the beauties which came most readily to his hand, making elaborate drawings of the decorations of Raphael, and the delicate architecture of Bramante and Peruzzi. But the rules of the school, with which his own desires heartily coincided, prescribed the sending to head quarters at stated periods of studies from the antique. Duban, in entering upon these studies, with the objects of them under his eyes, became at once sensible of the superficiality of the aspect under which they had hitherto been presented to him. He perceived that the principles of art could not be extracted from these imperishable monuments by cold transcription of their external forms alone; but that to imbibe their teaching, the motives and aims of their creators must be sought out in their material and moral condition and the accessories of their daily life. He investigated with the minutest care not only every detail of form, but of material, construction, and *genius loci*. He was shortly to be joined in the closest bond of friendship and collaboration with three congenial spirits, who entering with equal ardour and equal genius upon the common pursuit, were destined to establish, if not to initiate, the principle of coloured decoration, which has now become an universal article of faith. These were Henri Labrouste, who, obtaining the Grand Prix in 1824, joined the Academy at the end of that year; Louis Joseph Due, who followed him in 1825, and Léon Vaudoyer in 1826. His first “*envoi*,” made before he had formulated his ideas, and before the fire had been fully generated by contact with these congeners, was a study of the Portico of the Pantheon.

His next step, which followed upon the journey of Labrouste to Paestum and Sicily, and the

reports of Hittorff's discoveries of colour among the temples of Selinuntum, was a journey to Pompeii, where he first felt the magic inspiration of the antique glowing in all its colour and instinct with the life which the hard hand of time had effaced, at least from sight, from the monuments of Rome already known to him. The result of this journey, besides numberless studies and many living restorations, was a conviction of the important part played by colour in the monuments of antiquity; and his first expression of this conviction was a restoration of the Portico of Octavia and the Temples of Juno and Jupiter to which it formed the enceinte. In these drawings, his fourth "envoi," which bear the date 1828, he shows the walls of the cella of the Temple of Juno covered with pictorial subjects. The exhibition of these drawings raised much adverse criticism, and surprised, and even scandalized the steady-going professors of the old school. And this commotion was but intensified, when in the subsequent year Labrouste exhibited his drawings of the Temple of Neptune at Paestum, with its external and internal colouring set forth vigorously, completely, and without stint.

These, and forty other drawings, consisting principally of antique subjects; views and details of existing tombs, Etruscan and other; restorations and compositions in the style of the antique; compositions grouping existing Italian buildings, as well as others, the product of his own fertile imagination, were exhibited in the Ecole des Beaux Arts after his death, in 1872, and are described with a loving enthusiasm by M. Blanc in an article transcribed in the *Gazette des Architectes*,* and also by M. Beulé, in the *Eloge*, pronounced before the Academie des Beaux Arts, and published in the *Revue de l'Architecture*,† and by M. Baltard in the same.‡

The arches of Septimius Severus and of Constantine are mentioned among the subjects of his drawings, but it does not appear what were the subjects of his "Envois" of the second and third years. Duban had now reached his last year, and that period of his studies in which the rule of the Academy prescribe, as "Envoi de Vme. année," an original design; a practice to which all respect is due as that adopted by the most complete Academy in the world, but which seems an inapt climax to more speculative studies which are so far removed from the considerations necessary to the production of a practical design, considerations which circumstances must so soon force upon the student returning to the realities of practical life. The designs which he sent was for a "Temple Protestant." M. Vaudoyer says of it that it was by its *ensemble* and the expression of its architectural forms, certainly the work of a bold and sincere innovator, and that it gave rise to very warm discussion.

On Duban's return to Paris the interest which had been excited by his "Envois" procured for him an ardent welcome amongst the rising generation, and secured an immediate success to his efforts for forming a school. He opened an atelier, whether on his own account or as substitute for M. Blouet in the atelier of the latter, I am not able clearly to make out. The Revolution of 1830 breaking in upon the torpor which had succeeded to the activity of the Empire created a stir in art as well as in literature, and greatly favoured the propagation of the new ideas initiated by Duban, which had been treated as revolutionary, and styled by his detractors romanticism, and by his less adverse critics neo-classicism. But such depreciatory terms are far from giving a just impression of a leader and a school so earnest in their aspirations, so clear and logical, and so conservative in their methods. The article of faith of these men was that monuments are above all works of construction, and that no design could dispense with rational execution. Later on, means of execution came to determine form, but this was not the principle of their aesthetics. They maintained a deep reverence for tradition, holding it as one of the

* Gazette, Vol. 9, pages 44, 53, 60.

† Revue, Vol. XXIX, page 216.

‡ Revue, Vol. XXIX, page 22.

best means of expression in our art, and the most apt (having regard to the requirements to be fulfilled) to give point and character to an edifice. If, then, construction played an important part in their principles, this motive was subordinated, and at all events idealised by respect for traditional forms and composition.* Duban, indeed, succeeded by his illustrations of Greek works in proving what food for the most diverse minds is furnished by that classic art which appears monotonous to those only who are blind to its varied aspects, to its audacity, and even to its instructive errors.†

It has been said that Duban approached the study of architecture in the same spirit as Ingres that of painting; and, indeed, there was a sympathy of aim in these two great artists which was soon to be tested by co-operation in an important undertaking. The Duc de Luynes, the Mécènes of the France of the last generation, early appreciated the genius of Duban, and invited him to design for his chateau of Dampierre, a great gallery for the reception of the greatest works of Ingres, the "Age d'or," and the "Age de fer," and which was subsequently to enshrine the classical work of the sculptor, Simart, a friend and fellow pensionnaire of Duban, namely, the Chryselephantine Minerva, which many may remember in the Exhibition of 1855.

Duban was now launched in the career of practice, and during the few following years carried out many works which, though not in themselves of the first importance, placed his name upon a pinnacle which many more fortunate men have striven in vain to reach. These works, in which detail and decoration held a principal place, were for the most part restorations or additions. An exception is the beautiful little hotel of the Comte de Pourtalès, in the Rue Tronchet, illustrated in Victor Calliat's *Parallele des Maisons de Paris* (1835). Among them were the works at the Chateaux of Marmande, and of Sandat, in the department of Lot et Garonne, the Hotel of the Duc de Galliera, in Paris, and, above all, the Chateau de Blois. A recent acquisition to our Library illustrates by a series of beautiful plates and photographs the prodigious results of his fertile invention and loving antiquarian research in the resuscitation of this beautiful palace. I need hardly seek beyond these illustrations any evidence of the impertinence of the terms "Romantic," and "Neo-classic," above referred to, and it would suffice to apply to Duban the well worn phrase—*Si monumentum quæris circumspice*. But, if most of the works above referred to are unknown to my audience, it is not so with the restoration of the S^{te} Chapelle, begun by him, and in which the spirit of his work was adopted and carried out by M. Lassus, to whom he resigned the work when he became so deeply preoccupied with his work at the Ecole des Beaux Arts, to which I shall presently refer. Equally familiar to the most unadventurous travellers are his sumptuous restoration of the Galerie d'Apollon, destroyed by fire in 1661, its exterior, the Pavillon de Medicis, Henry IV.'s façade of the Vieux Louvre, and his decorations of the Salles des Sept Cheminées, and the Salon Carré.

But, amid the triumph of these brilliant achievements, the great desire which must burn in the breast of every man conscious, like Duban, of creative power, the desire to create, was destined to remain unsatisfied. It never fell to his lot to conceive and complete a unity in building. The nearest approach to the fulfilment of his ambition was furnished by his appointment as Architect of the Ecole des Beaux Arts. The work had been commenced, the general scheme prepared, and the foundations laid by M. Debret, Duban's brother-in-law. When, however, in 1833, the Government, desirous of providing occupation for the younger among the rising men, decreed that none of its employés should carry out simultaneously more than one public work, M. Debret, who held the appointments of architect

* M. Daviond, "Oraison Funèbre" at the funeral of Duban.

† M. Beulé, "Eloge" read before the Academie des Beaux Arts.

for the building of the Ecole des Beaux Arts, and also for the works at the Cathedral of St. Denis, chose to continue the latter, and surrendered his appointment at the former to Duban.

Except for the trammels (such as they were) imposed by the already laid foundations, and by some existing buildings, the work which was now entrusted to him was all that Durban could desire. The subject was an exceptional one: he was called to address himself as an artist to artists; to perform before an audience at once sympathetic and critical; to proclaim in the many tongues of arts, of which he was master, the truths which he had deduced equally from all. Here he might, without being charged with incongruousness, enshrine the casts and copies from the Greek in Greek architecture; prepare Italian loggias for the reception of those of the decorations of Raphael; and adapt the beautiful remains of the Chateaux of Gaillon and Anet to the architectural effect of his courtyard. The eloquent description of this monument given by M. Beulé, in his "Éloge," conveys a picture which no words of mine can approach. I cannot, therefore, do better than transcribe it. He says, "The Ecole des Beaux Arts is indeed a whole world, a world little known, because it is an inner world. One passes it without being aware of it, or contents oneself with visiting the special exhibitions. Yet there exists in Europe no building of this kind which can compare with it. Ateliers, amphitheatre, hemicycle, studios, class rooms, judgment rooms, prize rooms, exhibition rooms, archives, library, museums of architecture, of painting, of sculpture, all have been foreseen, or added by Duban; but the whole has received a varied character, an expressive decoration, a feeling at once philosophic and attractive, which exalt its charm and attest the depth of the architect's respect for his subject. Nothing has been neglected which could stimulate youth, whether by the spirit of the greatest artists, or by the sight of their works. Here Paul Delaroche is put to contribution to recall the images of those who have blessed humanity with the beautiful, and a magnificent setting is given to the pantheon of the arts where the laureates seem to receive their crowns from the hands of Ictinus, Apelles, and Phidias. Here the architect, desiring to recall the Sixtine Chapel, has placed in the old Church of the Augustins the Last Judgment of Michael Angelo, copied by Sigalon. If he arranged a portico he placed in it as a frieze in its majestic continuity the casts of the Panathenaic procession. If he arranged an arcade, recalling the loggias of the Vatican, he adorned it with copies of the paintings of Raphael, giving daily to the thousand students of Paris the joys prepared for his successors by the magnificent Leo X. French art was the object of no less love. The façade of the Chateau of Gaillon, the portal of the Chateau of Anet, raised by Alexandre Lenior, form a special motive of decoration. The admirably executed fragments of the Hotel de la Trémouille, which mark the aurora of our second renaissance, have been so admirably adjusted in the new constructions, that they seem its members rather than its ornaments. Finally, what remained of the fragments collected during the Revolution by the courageous founder of the Museum of French Monuments has been employed so picturesquely, so framed, so re-animated, so renewed, that out of ruins has grown a monument. What can be more complete than the quadrangle which begins with Arch of Gaillon and extends to the body of the building? On one side the exquisite details of the Chateau of the Cardinal d'Amboise, on the other Duban's façade, with its file of marble statues copied from the antique by the pensionnaires of the Villa Medicis. With the fragments of Gaillon two other arches have been composed, through which is seen a glimpse of the garden. These four cardinal points are united by circular constructions bearing like pictures fragments of the XVth and XVIth centuries. In the middle of the court a basin forms the centre of a decoration inscribed on the ground by an ingenious combination of marble slabs with the rough paving. One should be here in the morning when the obliquely darting sun leaves broad shadows. The court is yet silent; no sound disturbs the wanderer, to whom the yard becomes now the threshold of an Italian palace, now a piazza of

“ Northern Italy adorned by those gifted Lombards whom the Popes attracted to Rome ; now he
 “ imagines himself in Florence in some unfrequented piazzetta, near the Palazzo Vecchio, and it seems
 “ that another step will bring him before the Loggia dei Lanzi, or the Palazzo Strozzi.

“ In the garden an altogether different order of sensations commences. We are transported to the
 “ neighbourhood of Rome, to an unedited villa, or to some corner of a villa which epitomises the life
 “ and tastes of the Roman Princes. Upon lawns in the form of stadia are raised single columns of
 “ marble, bearing their caps only ; such votive columns as might be seen in the Forum, or are recorded
 “ on painted vases. Round-headed arches walled up to the sight line form an enclosure, giving way
 “ for the eye to rejoice in the shady delights of the neighbouring Hotel de Chimay. A fountain sheds
 “ its coolness around ; its façade, of monumental height, is composed of fragments of the sculptures of
 “ Paul Ponce, of Anguier, and of Sarrazin. Under the shade of the arcades are scattered with an
 “ artful negligence capitals, cornices, friezes, fragments of our native monuments which might rival
 “ even those of Greece and of Rome.

“ Finally, the very cloister itself of the old Augustins has been transformed by Duban into a
 “ Pompeian atrium. The upper storey forming an attic has the character of a Campanian interior.
 “ The great mulberry tree, the turf, the flowers, the fountain, the mosaics under foot, the bright tones
 “ of the walls, and the small statues remind one of, or rather transport one to, a Greco-Roman
 “ abode. A subdued feeling, a sort of serenity, unknown to the dweller in cities, calms the most
 “ restless spirit ; so powerfully has the architect expressed what was in his soul, and made to live
 “ that which he loved, and perpetuated for others, as for himself, the joys which he had known in his
 “ travels.”

This description, though conveying an impression far less vivid than that which many, perhaps most of us, carry in our memories, will suffice with the aid of the illustrations given in *Calliat's Encyclopedie* and the last volume of the *New Encyclopedie* to place before my hearers a picture of Duban's great work ; and little more need be said to illustrate his talent.

Of his personal character much has been said by his biographers ; but here, amongst artists, he must be judged by his works ; and it will suffice to say that his nature was at once as delicate and as firm as his art. His delicate sensibility is sufficiently attested by the love in which his memory is held by his contemporaries and his pupils. Of his firmness abundant example was given by his resignation of his post as architect of the Louvre rather than give way to the pressure put upon him by the Minister of Public Works, who had taken part in an outcry raised by the ignorant criticisms of the Press upon the works in progress in the Cour du Louvre. This persecution, together with the neglect which he suffered in other quarters under the Imperial regime, was a sore trial to Duban, and would have turned to gall a less noble nature than his. As it was, his health was seriously affected by the mortification and anxiety which he suffered, and in his later years he had to a great extent withdrawn from the more arduous engagements of his profession. Some consolations were however still to crown his life. He was elected a member of the *Academie des Beaux Arts* in 1854 ; and, in 1855, he was honoured with the award of the great medal of the Exhibition for his drawings, at the same time as his friend and fellow labourer Ingres for his paintings.

The decline of his health, though leaving his intellectual vigour unimpaired, had for sometime threatened his end ; and the rally which had taken place in the beginning of 1870 was too soon to be counteracted by the patriotic grief with which he was overcome by the disasters of his country in that terrible year. Upon the investment of Paris he had retired to Bordeaux, and here he ended his noble career on October 8, 1870. He was buried first at Bordeaux ; but, at the conclusion of the peace, the unanimous desire of his colleagues and of the whole artistic world claimed for his memory the honour

of a public funeral. His body was removed to Paris, and was followed to its last resting place, in the Cimetiere du Mont Parnasse, by all that was most illustrious in the society which he had adorned. His grave is worthily marked by a monument raised by public subscription, and designed by his compeer and friend, the only one remaining of an illustrious quartet, M. Duc.*

I may refer you to a few illustrations of his works which our Library contains, and which are—

Hotel de Pourtales.—In Victor Calliat's (?) *Parallele des Maisons de Paris*.

Chateau de Blois.—Work recently purchased; also, *Archives des Mon. Hist.*

Tombs.—Design for Tomb of Napoleon 1st, *Revue*, Vol. II.; Tomb of F. Arago, *Daly's Tombs*, Sec. I. C., plate 5; Tomb of M^{me}. Delaroche, Sec. II., plate 3; Tomb (Anonymous), Sec. III. A., plate 4.

Ecole des Beaux Arts.—Calliat's *Encyclopedie*; *New Encyclopedie*, Vol. V., plate 327.

LEON VAUDOYER was the son of Antoine Laurent Thomas Vaudoyer, an architect in high repute, an expensionnaire de Rome, and holding high government employ, the author of many important works, and also a professor and secretary archiviste at the Ecole des Beaux Arts, and a member of the Institute of France. In virtue of one of the several official appointments which he held, he resided at the Louvre, and here, on June 7th, 1803, Léon Vaudoyer was born. He was educated at the Collège S^{te} Barbe, and leaving it at the age of sixteen entered the Ecole des Beaux Arts. Here, under the teaching of his father, and also in the atelier of his cousin, Hippolyte Lebas, an expensionnaire and architect, and professor in great repute (and subsequently a Corr. Mem. of the R.I.B.A.) he carried on his studies for seven years. He early signalised himself in the competitions of his class and obtained several prix d'emulation. In 1821 at the early age of eighteen he was "recu enloges," that is to say he passed the preliminary sketch test for the Grand Prix de Rome. In 1822, in the same competition, he obtained a mention honourable, the subject being an Opera House. In 1823 he entered again without success. (The prizeman in this year was Duban). In 1824, the year of Labrouste's success, he obtained the second prize for a design for a *cour de cassation*. He likewise gained in the same year the medal called the Grand Prix Départemental, which is second only in importance to the Grand Prix de Rome. In 1825 he abstained from competing (the prize falling to Duc). In 1826, at last, he was successful with a design for a Palace for the Academy of France at Rome. On the last day of that year he started, and proceeded by stages of easy length, but filled with study, to Rome, where he joined the ardent, and soon to become illustrious, band, Duban, Labrouste, and Duc, whose competition had already stimulated, and whose friendship and co-operation were in the future so greatly to develop his genius. I have already, in the notice of Duban, adverted to the new principles by which these illustrious men were guided in their studies, and which they in co-operation had initiated. Vaudoyer's mind was singularly adapted to the development and application of these principles. His intellect was eminently analytical and subjective, and if he was less imaginative in his conception of the subjects which he illustrated, and less brilliant in his rendering than his colleagues, he amply supplemented these deficiencies by the thoroughness of his research and the clearness with which he rendered its result in his drawings.

A remarkable evidence of this quality is shown in the systematic character of his "envois," in which the several subjects taken up are followed out by a series of examples studied and compared in a manner to form a more or less complete treatise upon each. Thus in his first year he sent to the Ecole studies of the Temple of the Sun from the fragments in the Colonna Gardens, and the Temple

* Illustrated in *Revue*, Vol. XXV, plate 42.

of Marcus Aurelius called the Basilica of Antoninus. As a suite to these he sent in the following year comparative studies of the Doric Temple of Hercules at Cora, the Ionic temple of Fortuna Virilis at Rome, and the Corinthian Temple of Minerva at Assisi. These studies were completed (though not in his "envois") by illustrations of the Temple of Jupiter Olympius at Agrigentum, of Isis, Venus, Jupiter and Augustus at Pompeii, Jupiter Serapis at Pozzuoli, the small temple on the Clitunnus in the Umbrian plain, the brick temple of the God Rediculus at Rome, and the Temple of Bacchus. In the third year he sent studies of the Aqueduct of Claudius and of the Porta Maggiore. This formed the headpiece to a series of studies upon triumphal arches and gates, including the gate of Augustus at Fano, the arches at Ancona and Benevento, of Septimius Severus and Trajan, the Cyclopean gates of Alatrium, Arpinium, Cefalu, and Segni, in Sicily. The Porta Augusta of Perugia, the gates of Volterra and Ispello, the gate of Gallienus and that of Augustus at Rimni. In short specimens of every class from the rudest Cyclopean gates to the sumptuous monuments of the later Roman triumphs.

In the fourth year he sent a restoration of the Temple of Venus and Rome, a work of great importance, involving infinite research and accurate knowledge of the methods of design and construction of Roman art of the 2nd century.

In the fifth year he sent, according to rule, an original design for a "belfry for a frontier town of France." This design, as is usual with these "envois," does not appear to have attracted much attention, and little is said of it by his commentators. Besides his exhaustive studies of the antique, comprising complete series of tombs, villas and houses, and very many other subjects not mentioned, he followed out with almost equal completeness and accuracy seriated studies of basilicas and churches, of the palaces of Bologna and the villas of Rome, hospitals and lazarettoes, and civil and military magazines. The prodigious fruitfulness of his labours is attested by the fact that the exhibition of his drawings held at the Ecole after his death comprised 270 sheets of drawings made during his sojourn at the Villa Medici. It should be mentioned that the friendly co-operation of the pensionnaires at this, as probably at other periods, rendered production comparatively easy by the division of labour and the intercommunication of its results; so that the same drawings which are found in the folios of Vaudoyer are found reproduced more or less in those of his contemporaries, and *vice versâ*. Before following Vaudoyer on his return to Paris, it should be mentioned that before his departure for Rome he had gained in competition the commission to erect a monument to General Foy.* The execution of this work was superintended in his absence by his father, in whose hands it could not but have gained in excellence. During his stay at Rome, too, he was commissioned by Vicomte de Chateaubriand, the statesman and poet, then Ambassador to the Vatican, to design a monument to Nicholas Poussin, which was erected in the church of S. Lorenzo in Lucina.

On his return to Paris in 1832 he, like his friends and colleagues of the Villa Medici, opened an atelier, a field of utility in which his analytical mind and his complete studies especially fitted him to shine. He was far, however, from considering his own studies completed, and he pursued them with unremitting diligence both at home and by journies whenever leisure offered, in Germany, England, Spain, Algeria, and especially in France. The result of these latter travels especially is shown in the beautiful illustrations of the houses of the 16th century (of the Orleanais and Blaisois especially) in the "archives de la commission des monuments historiques" and his series of articles upon the history of architecture in France, published in the *Magasin Pittoresque* from 1839 to 1843. The former of these works procured for him a medal of the Committee of the Mons. Hist. The appointment as a member

* Illustrated in Daly's Tombs, 1st. sect. c., plate 3.

of that body and of the Commission des Arts et Edifices Religieux under the Ministère des Cultes. The latter procured for him the prix Bordin at the hands of the Acad. des Beaux Arts.

His practical career was commenced in 1832 as Inspecteur under M. Bordin, at the building of the Consiel d'état and Cour des Comptes. In 1835 he assisted M. Duban, and in 1836 M. Blouet (then one of the leading figures in the French school), as inspector in the temporary works of the Fêtes de Juillet. In 1838 he gained the first prize for an Hôtel de Ville at Avignon, which does not appear to have been carried out.

The easy circumstances of fortune in which he was placed, even during the life of his father (who survived till 1847), happily enabled him to follow the bent of his mind by applying himself to study and to the elaboration of such works as he undertook; and he rejected at this period, as throughout his life, all private work which might subject his art to the caprice of clients, or force him to devote to sordid or trivial considerations the time which he could so much better employ in the advancement of art and of his own reputation. Some few private works appear to have been forced upon him in the course of his career, but they do not seem to have been of sufficient interest to be individually recorded.

In 1839, upon the death of M. Philipon, architect to the Conservatoire des Arts et Metiers, he was appointed to the vacant post, and commissioned to carry out very considerable works, which continued to occupy a large portion of his attention during most of his life, and the plans of which comprise galleries at the back towards the Rue Vaucanson which are not even yet carried out.

This monumental work must be well known to many, if not most, of my hearers, and in the unfortunate absence of any illustration of it, it may suffice to remind them that the building, as delivered into the hands of Vaudoyer, comprised the ancient church of the Abbey of St. Martin des Champs, with its apse of the XIIth and nave of the XIVth centuries; its beautiful refectory of the XIIIth century, the grand staircase by Antoine of the last century, and some galleries and apartments which I am not able to particularize; and that the work which he had to carry out was a reversal of the frontage and complete readjustment of the plan with very extensive additions, a restoration of the Mediæval buildings, and their adaptation to their present uses (the church to that of an engine museum and the refectory to that of a library), and finally the uniting of the exterior of the scattered buildings into a symmetrical and harmonious whole. In this task he has shown the love and research of the antiquary (and this before the Dictionary of Viollet le Duc, and the endless learned researches of the last forty years, had lent facilities to such works), united with common and uncommon sense in planning, and with the independence of a self-relying son of the XIXth century, an "heir of all the ages," with a result which truly does honour to his name and to the age and school which produced him.*

His fame as an executor would have rested entirely, or almost entirely, upon this work, had he not been appointed in 1845 by the Ministre des Cultes to prepare a design for a cathedral at Marseilles. It seemed hardly probable, as he thought, that this work could be carried into execution. The old cathedral, the Mayor, such as it was, occupying the site of the proposed new edifice, was to be preserved for the continuance of the services; and this, with other delays, and the political troubles of 1848, seemed destined indefinitely to postpone the carrying out of the work. Such, however, was his interest in the subject that he continued during seven years unremittingly to study his plan. The general conception was from the first such as it is now carried out, but every part, every proportion, every detail, was studied and restudied, and the building drawn and modelled in fractions and in whole, over and over again. At last in 1852 the first stone was laid. Still it seemed unlikely that he would carry it even so far as he was permitted to do, but so great was his yearning for perfection in his work, that

* For description see *Annales de la Soc. Centrale*, 1873, pages 84 and 85.

when an offer was made by a great banker to provide the funds in advance of the annual credits of the government, he reported against the proposal, believing that so solemn an undertaking was not to be forwarded by stock-jobbing manœuvres, and that the lapse of time which threatened to drown his hopes of fruition, was a necessary sacrifice to the perfection at which he aimed. Here again, unfortunately, our Library fails to provide me with an illustration,* but I trust that at some future time I may be able to exhibit photographs of this and some other works referring to the subjects of this Paper, which the interest which the study of their lives has excited in me, arouses a desire to procure. This great work was complete at the time of his death, as regards the exterior, with the exception of the covering of the domes, and the realisation of his most ardent wishes for the success of his work has been since secured by the loving care with which his designs have been carried out by his pupil and friend, his *inspecteur* Henri Espérandieu, who was to follow him, alas! too soon, to the grave.

These two great works were supplemented by but very few minor ones. As I have said, he rejected private work, and employed but a small portion of his life in those few to which he was forced by the desire of private friends. The cemeteries of Paris contain a few monuments which are not the less evidences of artistic power for being small and unpretending. Such are the tombs of General Foy and of Poussin already mentioned, that of Adolphe Nourrit the singer, of Admiral Truguet, and his own family tomb.† He was commissioned in 1852 to prepare plans for the enlargement and readaptation of the Sorbonne in conjunction with M. Baltard; but though he prepared very complete studies, and even laid a first stone, he felt that the two great works to which he had devoted himself forbade his diverting his energies from them, and he therefore withdrew from the work. Besides his works in hand he had been appointed one of the diocesan inspectors, and was also engaged in the duties of the other public committees above named.

I cannot conclude the notice of his life without giving one more illustration, however trifling in itself, of the practical turn of his mind, lest it should appear from the above description that he was in any sort a dilettante or a dreamer. In the midst of his artistic occupations, to him so absorbing, he was able to devote himself to the practical question of the effects and prevention of damp in buildings, and upon this theme he wrote an essay in 1843, which gained a prize offered by the Société d'Encouragement de l'Industrie Nationale. In 1868 only he was elected to the Académie des Beaux Arts where he had been preceded by his "camarades," Duban, Duc and Labrousse, and which he was destined, alas! to adorn for so short a time.

His death took place suddenly in the exhibition room of the Ecole des Beaux Arts while examining the competition drawing of his pupils and surrounded by his colleagues, still apparently in the vigour of his intellect, and belying by his activity and his capacity for work the seventy years which formed his honourable crown of age, and during which he done so much for the glory of his school and his country. He made many distinguished pupils, *e.g.* Davioud, Juste, Lisch, Hugé, Auvray, Espérandieu, and many others.

In the two sketches which I have brought before you it has been my endeavour to give some suggestion of the vigour and vitality which has given birth to and guided the growth of the highly original art which marks the French school of the second quarter of this century. But the picture must fail in one of its most striking passages for the want of materials to frame an adequate memoir of HENRI LABROUSTE. I have sought in vain in the professional publications, and in the illustrated

* Description see Annales de la Soc. Centrale, 1873, bottom of page 87 and half of page 88.

† See Daly's Tombs, sect. I., plate 5; sect. I., C. plate 3 (Gen. Foy); sec. II. A., plate 18; sect. II. plate 3; sect. II. C., plate 4 (Truguet).

works in our Library for such materials as are readily attainable for other memoirs ; and the enquiries which I have made at headquarters have met with no better success. A memoir is promised in the *Gazette des Architectes*, but it has not yet appeared.

I console myself with the reflection that good wine needs no bush, and that the reputation of the author of the *Bibliothèque S^{te} Geneviève*, and the great works at the *Bibliothèque Nationale* can gain nothing by any feeble tribute which I might pay to it, even with an audience so sympathetic to his memory as the present one. Fortunately our Library affords in the *Revue*, Vols. X. and XI., more complete illustrations of the *Bibliothèque S^{te} Geneviève* than are to be found of the works of some of Labrouste's compeers ; and in the same work, Vol. XVI., an illustration of the versatility of his talent is given in the plates of the Hotel which he erected for M. Fould in Paris.*

But though these two works so different and even opposite in their character show versatility, let it not be imagined for a moment that Labrouste was an eclectic, or that he was wanting in convictions, or as some in these days of rapid change might call them, prejudices. His mind was eminently classical and his classicality was his own. It was not that of his master Lebas ; it was not that of his friends and fellow pupils Duban, Vaudoyer, and Duc ; it was not copied from the Greek, it was not copied from the Roman, nor from the Etruscan. He had studied under the same master, had followed the same school courses, had made the same foreign studies at the same time, and had lived for fifty years in the closest artistic communion with the men I have named ; but he, like they, gave the crowning proof of greatness in maintaining a clearly marked individuality, uninfluenced by any bias but that derived from his own reading of the pages of the past.

If, as I have tried to show, these men made a school, and inspired their pupils with something of the living truths which had been their own guide, unfortunately those *principles* have not been always understood, and a royal road to artistic expression has been sought by too many in imitation ; the forms have been repeated, but not so always the spirit. Thus the casual observer may fail to distinguish in the rich flood of contemporary French art the four streams which springing from one source flowed so long in such varied, though parallel channels ; and may carelessly shuffle the leaders together, as they may with better reason their followers.

Labrouste's nature, highly sensitive and severely conscientious, led him to regard his art as a thing sacred, and not to be profaned by superficial treatment, or by application to sordid or common purposes ; and to this must be attributed the fact that he never sought or obtained success in ordinary practice. Indeed, it appears that almost, if not absolutely his first practical work in building, was the *Bibliothèque S^{te} Geneviève*, the commission for which he obtained only at the age of 42, in the year 1843. He devoted himself for seven years to the conception and execution of this work, in which the sobriety united with originality and refinement of a deep thinker upon art are exhibited in combination with the thorough practical elaboration of the constructor and workman. The general features of this building are too well known to need description, while those who are unacquainted with it may gather a good knowledge of it from the plates in the *Revue* above referred to. The masterly treatment of the iron construction, the precautions against fire, and the details of utility in every part down to the construction of the book-shelves and of the reading desks, may be studied with infinite advantage by all architects. It should be recorded as a crowning triumph in this work that it was completed for less than the sum assigned to it. In the great reading room of the *Bibliothèque Nationale*, and its vast book stores, all these practical questions have been further

* Vol. XX, plate 1, a tomb.

elaborated with many ingenious improvements. Here, too, the artist with larger means at his disposal, using richer materials and a fuller decoration, has shown his greatness in a still higher degree by subduing splendour with modesty and refinement. This work is but too little known, but I venture to think those who are acquainted with it will bear me out in the opinion that amid all the splendours of the Imperial era no work can equal or, at least, surpass this of the anchorite Labrouste.

Having thus given a brief sketch from my own knowledge and gleanings of the life of Labrouste I am reduced to give as an historical statement the brief notice of him which appeared in the *Builder* at the time of his death, with which I shall conclude this Paper :—

“ Pierre François Henri Labrouste was born at Paris 1801, the youngest of several children, one of whom became director of the celebrated Collège Sainte Barbe, and another was, like the deceased, an architect of ability, and, though the senior, survives him. After a good general education, he entered the “ atelier ” of M. Vaudoyer, sen.; and subsequently that of M. Hippolyte Lebas, and studied architecture under these two respected masters, and at the Ecole Royale des Beaux-Arts, where he was not slow in realising a brilliant success. In fact, at the age of twenty he obtained the Deuxième Grand Prix for a design for a Palais de Justice; at twenty-two the Prix Departmental (at that time bestowed on the pupil who could count the greatest number of successes); and, lastly, he obtained in 1824, at the age of twenty-three, the Premier Grand Prix, for a design for a ‘ Cour de Cassation.’

“ The five years, from 1824 to 1829, were accordingly passed by Henri Labrouste in travelling over Rome, Italy, and Sicily, at the cost of the French Government; and seldom has a gift of this kind from the public funds been better employed; for the study which he sent home, in 1828, of his designs for the Restoration of the Temple and Basilica at Paestum, comprising an essay and twenty-three sheets of drawings, is one of the most remarkable and splendid collections of drawings of its class, and one which, it may be added, may at the present day, after an interval of nearly fifty years, still be adduced as a model of conscientious investigation.

“ When Labrouste returned to Paris, M. Felix Duban attached him to his staff, as inspector of construction in the ‘ Ecole des Beaux-Arts;’ and, in 1840, he was charged, along with M. Visconti, with the important duty of superintending the decorations in connection with the funeral ceremony consecrating the return of the remains of the Emperor Napoleon I. to France. Labrouste displayed real talent in his application of architectural design of a high character to these decorations, and owed to this mainly the ribbon of the Legion of Honour, which was bestowed on him shortly afterwards, in 1841. In 1848 he was again called upon to undertake the decoration of a funeral ceremony, this time for the victims of the insurrection of June of that year.

“ Since his return from Rome, however, he had himself opened an atelier, where he collected some of his future brethren in the art, giving them the same insight into the spirit of ancient art which he had acquired himself, and inculcating the observance of the rigorous laws which construction imposes upon architecture itself even more than that on decoration. From the period of his career when Henri Labrouste and his friends, Duban, Vaudoyer, Duc, and Constant Dufeux, carried on vigorous war with the tendencies of the ‘ official ’ French art of the period (an opposition most strenuous on the part of Labrouste), we may date the formation of a remarkable group of artists, among whom, besides those whose loss we have to regret (Lassus, Laval, and Sibert), we may count MM. Boeswilwald, L’heureux, Millet, Mimey, Lisch, Darey, Verdier, Vandenberg, Bouwens, Leon Dupré, Simonet, &c.

“ In 1849 and 1850, Labrouste was able at last to realise his dream, and to make, in a great building of superior class, the application of twenty-five years study. Being charged, on the death of M. Visconti, with the work connected with the enlargement of the National Library, Henri Labrouste there also left his mark, by the best known and most interesting of all his works, we mean the restoration

of the portions adjoining Rue Vivienne, Rue Neuve des Petits Champs, and Rue Richelieu, and the new reading room with its vast magazines of books, and its accessory departments of service. It was with these latter works that he was almost entirely occupied at the time of his death.

“ Besides the above-named works, Labrouste, as ‘ General Inspector of Diocesan Edifices,’ exercised a most important influence upon those ancient and modern, under this department. He was likewise member of the ‘ Commission des Monumens Historiques;’ and among the beautiful drawings which procured him, in the ‘ Exposition Universelle ’ of 1855, a medal of the first class, we may mention his studies of the Tour de Montlhéry, exhibited in 1867, at the Palace of the Champ-de-Mars.

“ It was only in 1867 that the Institute of France opened its doors to him; and in 1868 the ‘ R. I. B. A.’ and the ‘ Royal Society of Portuguese Architects,’ both elected him an honorary and corresponding member. He was, besides, member of the ‘ Commission des Beaux-Arts de Ville de Paris,’ and honorary member of the ‘ Société Libre des Beaux-Arts,’ and of the ‘ Société des Architectes de Lille et de Clermont-Ferrand.’

“ As to the ‘ Société Centrale des Architectes,’ Henri Labrouste was, in 1841, concerned in its formation (and indeed designed its remarkable medal of membership), and was successively Member of its Council, Secretary of important committees, then Vice-president, and was elected President in 1873. It was in that capacity that he presided in 1874 and 1875 over the second and third sessions of the Congress of French Architects; and our readers will have seen in the *Builder*, of the 19th and 26th of June (page 544, 564, *ante*), how he gave on that occasion evidence of his devotion to his art, while his name formed the best rallying-point round which the architects of France could group themselves.

Mr. R. P. SPIERS, Associate.—We are much obliged to Mr. Cockerell for his Paper, and no more sympathetic mind than his could have undertaken the task. I think the biographical sketches read will be to a great many present full of facts of the greatest interest. Having studied myself in the French school, and knowing the deep feeling of reverence and respect which was felt towards the architects whose memoirs have been just brought before us, I have followed every word that has been said with interest, and can bear out all that Mr. Cockerell has brought forward. It is not usual in this country to refer to the profession to which we belong as one which can be pursued simply with the object of producing the highest works of art, without the necessity of getting our living by it. It may therefore be regarded as a fortunate circumstance that two of these architects were possessed of sufficient means to enable them to continue their studies without being obliged to enter upon general practice; and it has been of great advantage to the French School that they should have been able to do so. These men have always been held up as great stars of architecture in France, and their lives will be always held in memory, and their works will be handed down to posterity as illustrations of some of the finest efforts of French art. I beg to propose a vote of thanks to Mr. Cockerell, and to express a hope that on future occasions our Hon. Secretary for foreign correspondence will favour us with further memoirs, of like interest, of distinguished foreign architects who have passed away.

Mr. WYATT PAPWORTH.—I beg to second the vote. With regard to the memoir of M. Labrouste, I had hoped to have heard some description of the arrangement and details of his celebrated edifice at Paris, the library of Geneviève,—it is so exceptional a building that it should not be passed without notice. Libraries in Great Britain have been—and are likely to be—extensively built, and I think M. Labrouste’s design is quite a pattern for provincial cities. It combines the library, reading room, and places for study in a compact form, in a thoroughly well designed building. I do not think Mr. Cockerell mentioned the year in which M. Vaudoyer’s death occurred. I still regret, as I noticed in the earlier part of the evening, that Mr. Cockerell did not find it convenient to put upon the notice

paper the names of the architects whose memoirs he was about to present. If he had done so, I think we should have come down prepared to say a few words, and there might have been a better attendance of numbers. With the exception of M. Labrouste, I had no idea of the names of the eminent architects that were to be brought before us, and there are some not referred to, who might probably have been included in this evening's discourse.

Mr. GEO. H. WEST, Associate.—I agree with what Mr. Cockerell has said, except that the more disinterested devotion to their art of French architects as compared with their English brethren, is to some extent explained by their different circumstances. There are two classes in France: there are architects who go in for public monuments, and there are those whose position corresponds very much with that of English Architects. Young men starting as architects in France have to make up their minds which road they intend to follow, and only those who have distinguished themselves in the public classes and examinations, are likely to obtain State or Municipal appointments. Besides these, however, is an immense number of architects of considerable ability, though their names may be little known out of their own country, and their position corresponds very nearly with that of their English brethren. With regard to M. Duban, I quite agree with Mr. Cockerell, as to his being one of the greatest architects of this century. He had, however, the reputation which I fancy was deserved, of being extravagant, because he had a habit, which prevails more or less amongst French architects, of studying the details of his buildings during execution, and of making drawings chiefly in geometrical elevation, and comparatively little in perspective, and then, when a building was half up, of working with full sized models, and even of altering work already carried out. This was notably the case, I believe, with some portions of the building of the Ecole des Beaux Arts, and of course the system was a very costly one. In the same way M. Vaudoyer at Marseilles used full-sized models to a great extent. In 1872 I saw in the Cathedral two or three full-sized models of the galleries executed in wood and plaster. The whole of this building indeed was carried on from models rather than from drawings. In the workshop of the inspector there was a very large model of the whole cathedral, in which alterations were made from time to time, according to the ideas of the architects. With regard to the dome of the Cathedral, there was a question of construction as to the settlement which took place. The dome was built upon triangular-shaped piers. The place being an irregular sided octagon. The whole weight of the dome was thrown upon the base of this triangle—that is on the face of the pier—and all the stones were cracking somewhat in the same way as at the Pantheon in Paris. Of course the design could not be altered then, but directions were given to put in two iron struts to each pier, in order to carry the weight down on to the apex of the triangle, and so to load it more evenly and prevent all the pressure being thrown on to the inner face of the pier. In short these struts were intended to do, more or less efficiently, what is effectually done by the four turrets which stand round nearly all Moorish domes. The chief defect in the exterior of Marseilles Cathedral is the excessive straightness of the west front, the vertical lines of the towers being unbroken by buttresses. There consequently the façade looks bigger at the top than at the bottom. Duban attached more importance to beauty of decorative detail than to construction. Labrouste looked first to the construction and considered the decorations as strictly dependent on it. The front of his National Library shows in a remarkable way how careful he was compared with most French architects about points of construction. Instead of 6 or 7 rustications in one piece of stone, all his work is carried out in regular courses. In his library there are two courses of rustication to each course of stone, and the true and false joints correspond. We must all feel obliged to Mr. Cockerell for preparing these memoirs in the way he has done, and I venture to express a hope that we may have many more such careful and critical appreciations of the works of foreign architects.

The vote of thanks to Mr. Cockerell was unanimously passed, and the meeting then adjourned.

Royal Institute of British Architects.

At the Ordinary General Meeting of the Institute, held on Monday, the 15th of May, 1876, CHARLES BARRY, President, in the Chair, the Discussion of Mr. A. PAYNE'S Paper, read on the 10th of April, 1876, was resumed, the subject being

CONCRETE AS A BUILDING MATERIAL.

The PRESIDENT having invited discussion,

Mr. CHARLES FOWLER, Fellow, said: As I moved the adjournment, it may be expected that I should open the Discussion. I confess I did so rather from a desire that the discussion should be continued than as proposing to offer any particular remarks of my own. I had hoped that a gentleman would have been here who, I know personally, has had great experience in the use of Portland cement concrete, and I may mention that a very large building has been erected for Messrs. Waterlow within the last two years in which this material has been extensively used, and it was so used, I believe, because the experience in a similar building was very favourable. That building was completely gutted by fire, and those portions of the building constructed with Portland cement concrete, with iron bedded in it, not only withstood the fire perfectly, but were the only parts which did withstand it. The cast iron melted, the girders twisted and buckled, and almost everything except the cement concrete was injured or destroyed. The new building I allude to is a very large one. I forget the dimensions, but the structure is so large that, in order to bring it within the limits of the Building Act, it was obliged to be divided into eight or nine separate buildings by party walls and floors, which will give some idea of the dimensions. In this new building the fire-proof floors are formed in Portland cement concrete, a thickness of 7 inches being considered sufficient for that purpose. All the ironwork is embedded in the concrete, and the floors are divided into squares of a certain size. One great advantage obtained in that building is this:—Of course light, in a building intended for manufacturing purposes, is of the utmost importance, and there the designer has adopted the plan of making bulkheads under the windows, so as to give additional height to that portion of the story underneath. These bulkheads are constructed in the same manner as the fire-proof floors, so that these are, as it were, sloped up to the window sills. I do not think in this case the columns are enclosed in concrete, but all the girders and ironwork of the floors are entirely enclosed in this material. Of course I need not say it is of the utmost importance that the ironwork used should be entirely covered, and owing to the plastic nature of the material that is easily accomplished, because you can make your moulds of any form so as to enclose the ironwork. A question was raised at the last meeting as to whether it was not difficult to form a fine face where concrete was used in cast blocks, but it is not at all. If a particular form is to be repeated a great number of times it is worth while to make the mould of metal—otherwise, simply of wood. To effect the fine facing it is only necessary to run in first a coating of thin Portland cement, almost pure, and then fill in the concrete; while the block is yet wet the moulder goes over the surface and forms a perfectly smooth face, and that face, I know, is very hard, and quite different from that produced by rendering in Portland cement in the ordinary way. In the case of treads of stairs the face thus formed

is exceedingly hard, and seems to stand wear even better than any stone; in point of fact it wears so well that, like all other very hard materials, it becomes too smooth and gets polished and slippery, and that is the only difficulty. It is, however, an admirable material for steps, as it can be moulded into any form that may be wished. There is one question I would wish to ask of Mr. Lascelles, who gave us some particulars on the last occasion of a large window frame in concrete which he exhibited. It was stated that the cost was less than wood. That seemed a rather striking thing, and one would like to know whether that was correctly stated. There is also a question which might occur to many—viz., how the window sashes or casements were intended to be fixed? I may mention that while Portland cement concrete is fresh it is very easy to fix joiner's work to it, as it is by no means difficult to drive nails into it, and that is another recommendation to its use. It is therefore a convenient material for lintels. With reference to putting the ends of timbers into concrete walls, I think it would be unwise to do so unless they were protected in some way to prevent the end groins from absorbing the moisture out of the concrete, which might cause dry-rot, and has, in fact, been found to do so in some cases were carried a certain distance into the walls. I hope there are others present who will be able to give more information on this subject than it is in my power to do.

Mr. W. H. LASCELLES, Visitor.—I have made similar window frames of concrete to those which I exhibited here on the last occasion—fixed and in position—and I have brought some photographs of them for the inspection of the members. I have also some photographs of ordinary wooden windows of similar section, and you will see that the concrete looks just as well as the wood. With regard to comparison of cost, I would say in the case of making a large number of windows the concrete would be much cheaper than wood: in the case of a few windows it would not be so. The chief cost would be for the moulds. The cost of a mould for the concrete would be about the same as a wooden window, and after that the concrete can be made just as cheap. If the question lies between stone and concrete, the latter is cheaper, and lighter, and quite as durable as stone; and I am right, I believe, in saying these are the first concrete window frames that have ever been made. Mr. Whichcord asked me one or two questions on the last occasion which I was not prepared to answer. I have made inquiries, and can answer them now. One was whether iron, when embedded in concrete, was affected by heat. I find it is not, and Mr. Matthew Allen, who built the warehouses referred to as having been gutted by fire, and the concrete alone stood, told me that in that building there were pieces of iron, three inches by a quarter of an inch, embedded in the lintels in the centre of the concrete, and the heat did not affect the concrete at all, although the sill of the doorway was of large span. The iron doors were destroyed; the sills were pulverised, there being scarcely a piece of the size of the palm of the hand, while the concrete which formed the lintel was not at all injured, but was as firm as when put in. The proportion of the concrete was one of cement to six of breeze, and the lintel was formed in position by a rough mould of wood and the stuff poured in, and these pieces of wood were used to keep it in form till the concrete set. A question was raised by Mr. Blashill as to moisture in concrete. I find in some cottages I built, the walls only one inch thick, there was no moisture to speak of deposited on the walls, whilst the roofs, formed of the same slabs, and covered with my tiles were not free from deposit of moisture on the under side. There would, no doubt, be moisture unless there was a double lining between the roof and the under surface, from atmospheric condensation. One gentleman suggested on the last occasion that he could hardly see the advantage of making concrete to imitate tiles, when the real article would do as well, or better. I can understand the objection raised by that gentleman, but when I tell him the cost of concrete walls is only about one-third that of brickwork covered with tiles, it becomes very much a question of economy, and it is by this means I am endeavouring to solve the great cottage problem. It is one which a great many have worked at, to produce a good cottage

at a moderate rental to give a fair return upon the outlay, and that can only be done by economising materials, or by designing new means of constructing houses. In the present state of the material and the labour market that problem is yet far from being solved, and to reduce the quantity of material from $9\frac{1}{2}$ thick to one inch it will be admitted is a great reduction indeed. I am sanguine that I shall be able to build four-roomed cottages, of a respectable and ornamental character, at a prime cost of £100 each, and if I can succeed in doing that it will be a triumph for the concrete system, because it has been tried in every other possible way, but without success.

The PRESIDENT.—When you have succeeded in doing that I have no doubt you will communicate the fact.

Mr. P. BRANNON, Visitor.—Some pertinent remarks have been made with reference to the subject of framing embedded in concrete. Without being desirous to place myself in too prominent a position one must use the large "I" in speaking of our own doings. In 1872 I addressed myself to this question, and as some gentlemen are aware, I have built a cottage as a specimen of what may be done by a combination of concrete with tensile materials. In that way I made the heads for windows, described by Mr. Lascelles in 1872, by bedding rods of angle-iron, and dispensing with any framing or bressumer over openings of large space. There have been some remarks made upon the subject of frames of windows and doors, and I am quite sure antiquarians present will tell me that I am not introducing any novelty if I object entirely to window and door frames. The only proper doorway I conceive to be formed of the material which constitutes the walls of the building, and I find no difficulty in dispensing with the usual framings of wood or iron. I have put in doors which are unaffected by heat in St. Paul's Cathedral, under Mr. Penrose, in order to render fire-proof that portion of the dome to which the public have access. In that case we found no difficulty in attaching the fire-proof doors to the Portland stone of the building itself. I object alike to both frames and doors of iron, which, at a high temperature, will melt, and at a moderate temperature, will become distorted. The King and Queen Granaries in Bermondsey were in greatest part destroyed in consequence of being fitted with iron doors. The effect of fire upon them is sufficiently proved by Captain Shaw, who is now giving evidence before the Parliamentary Committee on Fires in the Metropolis. In his otherwise very useful work on Fire Surveys, he appears to me to have gone rather beyond his last in offering suggestions to us as to remedial modes of construction with which I think architects will not be inclined to agree. No doubt Captain Shaw is highly competent to deal with fires in the best possible way when they occur, yet from want of practical acquaintance with constructive resources, he makes some very contradictory suggestions. To satisfy myself on this point I had, for experiment, one of my stone-felt doors set in an iron frame exposed to a huge fire all night. The result was the iron frame was pulled out of the wall and twisted like parchment under heat, but the door (though from the bursting of the iron it canted) was not cast or warped in the slightest degree. I am building a fire-proof house now, and in order that there might be no objection raised as to the difficulty of attaching the doors and other fittings, it became necessary to have a quicker mode than my original one of attaching them with "hanging-plates," or pieces of iron, having turned-down ends. For ordinary cottages or for warehouses, where the quantity of combustible materials would not produce a very intense heat in case of fire, it would be perfectly safe to use the method we have adopted in this case. From the timbers of a wreck on the neighbouring beach blocks of oak were cut with the edges scored, and these were buried obliquely in the wall so that a portion of the wood was at the surface in the rebate, where it was necessary to attach the wing of the butt, and we find no difficulty in attaching the hinges in this way. I enter into this explanation as it is necessary to show that whilst we dispense with door frames we must have something to fix the doors to. In the case of some cottages I built in Derbyshire,

I made concrete of the slag of furnaces ground with selenitic lime, and I found the concrete so prepared made very efficient walls, and the compound formed a material, in my judgment, nearly as good as Portland cement concrete. With regard to the general treatment of concrete I may remark: I am at variance with the prevailing ideas as to that which is called concrete at the present day. I think true concrete construction, in point of fact, goes back to the good, sound old rubble with the stone walls, of rubble embedded in and united with fine concrete, the mason's "*stone mortar*," all well grouted together. Worked in that way it is infinitely superior to the manipulation of rounded stones, or pebbles, for to make strong good work the ballast should be angular. In relation to fire-proofing the great point with concrete is the proper selection of materials, and we have everywhere materials at hand which are proved to be entirely fire proof. As a rule I would invariably use the hardest burnt clay I could get, and in the buildings we have submitted to fire we have found the Portland and burnt ballast concrete only the harder from every calcination to which it has been submitted. Another point is the employment of materials having tensile strength in combination with concrete, which has compressive strength, and this is indeed the only way in which you can realise in the use of concrete the ultimate strength of which it is capable.

Mr. ARTHUR CATES, Fellow—From an observation made during Mr. Brannon's remarks it would appear that his statements have not been clearly understood by some present. He has used the term "stonefelt" as applied to doors, &c., and by this he means what we have had here called "concrete." Mr. Lascelles, on the authority of Mr. Allen, has given us an interesting instance of the manner in which iron doors and stone thresholds have practically disappeared under the action of fire, while the concrete lintels, exposed even to a fiercer action of heat and flame, remained comparatively uninjured. The instance of the King and Queen Granary where iron doors failed successively and the fire entered each division of the great building ultimately destroying the whole, have also been referred to. And I apprehend that the effect of Mr. Brannon's remarks would be to urge on us that if in these instances his "concrete" doors had been used instead of iron, they would have resisted the action of fire as completely as the lintels referred to by Mr. Lascelles, and one compartment only of the King and Queen Granary would have been destroyed. I understand that Mr. Penrose has adopted this application of concrete for the protection of the timber framing of the Cupola of St. Paul's from risk from fire, and this afternoon I accompanied Lord Elcho to Canada Buildings, King Street, Westminster, to inspect doors which have been fitted up in the ground floor corridor by Mr. Brannon. The window frames exhibited by Mr. Lascelles at the former meeting, were very remarkable, but here were doors made of concrete, moulded on the face in six panels, thin, light, and perfect in surface, ringing with a clear metallic sound, apparently quite homogeneous, and as perfect in appearance as any ordinary material. And if Mr. Brannon's statement of the fire resisting properties of this material can be relied on, the application of it in this and in similar manner deserves serious consideration from us, for all must admit that except in the most expensive form, iron doors are insufficient to prevent the spread of fire.

The PRESIDENT.—Mr. Drake is present, as he was on the last occasion, and I particularly wish to call upon him to-night because some remarks were made by Mr. Banks as to the failure of some concrete buildings at Whitehaven.

Mr. C. DRAKE, Visitor.—I have some facts which I shall be happy to lay before the meeting. It is not unknown to many present that I have some practical acquaintance with concrete building. During nearly ten years past I have been exclusively occupied with it, and I believe I can claim, without exaggeration, to have erected more concrete buildings than any other person. I can also claim that the numerous buildings, which may be counted by thousands, erected under my patent during the past eight years have been undeniably successful in every structural sense, and have proved conclusively to

all who have cared attentively to examine and test them, the economy, strength, dryness, perfect soundness, and other great advantages of concrete buildings. In order that these facts may not rest upon my own statements only, I have brought with me this evening photographs of a few of my buildings. I have also brought with me the written opinions of some of the Fellows and Members of R.I.B.A., and also the written opinions of the proprietors of the buildings, given after several years of occupation. Being in possession of these facts, it will not surprise you when I say that my disappointment has been great to find amongst architects considerable reluctance to have anything to do with concrete buildings, and, with very few exceptions, little or no desire to know anything of it. You will rightly argue that there must be a reason for this state of feeling, and I beg to submit that there is one sole reason—viz., want of knowledge. Prejudice is often spoken of, but prejudice vanishes when knowledge comes. A few years ago little or nothing was known of the structural capacities of Portland cement, but, as I have shown, experience has taught us that, structurally, it is capable of easy, cheap, reliable, and more various application than either stone or brick for structural purposes. I shall point out presently that there is still a vast deal to be learnt in the more advanced structural applications of Portland cement concrete, such as upper floors, roofs, and staircases; at the same time I venture to say there has been ample knowledge at the command of architects to ensure the building of good reliable walls. Yet these have not been built by the majority of architects. Why? I submit because they have not known how to treat it architecturally. As soon as concrete was seen not to conform to the rules laid down by the men of past ages for the architectural treatment of brick or stone it was neglected. I had the pleasure to hear Mr. Payne's Paper read, and the pleasure and pain to listen to the Discussion which followed. When Mr. Payne presumed that nobody would dispute that a building of good concrete is quite as good for all practical purposes as one built of brick or stone, I began to promise myself the pleasure of listening to a Discussion that should sweep away the stumbling block of difficulty in the architectural treatment that has hitherto stood in the way of the progress of concrete building. I venture to think that Mr. Payne himself was equally disappointed with myself to find the Discussion, although extremely interesting and suggestive in many particulars, going away from Portland cement concrete house-building and its architectural treatment into lime concrete foundations and engineering works—some the work of past generations—constructed in ignorance of the proper treatment of the materials used, and pointing out the weaknesses of lime concrete in these totally different works as warnings against Portland cement concrete buildings. A great deal was said by some who joined in the Discussion about a liability to shrinkage, or contraction, of concrete, and from similar statements made previously by the same speakers it had got to be believed that Portland cement concrete must necessarily shrink and go on shrinking in obedience to some such natural law as that which governs the contraction and expansion of iron. Now I may be allowed to say that there exists abundant proof that this idea is entirely fallacious, and I venture to assert that good Portland cement concrete, or good selenitic cement concrete, or good lias lime concrete, correctly treated, will never either contract or expand in the smallest degree after having once set. Instances were stated of cracks having appeared in concrete work, but these instances, with one exception, all referred to lime concrete, and no cause was shown for referring those cracks to contraction and not to settlement. Of course, concrete made with unslaked lias, badly-burned lime, or bad cement, may contract and even disintegrate entirely. But is such a fact, I would ask, sufficient to substantiate the general charge that has been made in the face of overwhelming evidence to the contrary? It is remarkable that only one instance was mentioned of cracks in a modern Portland cement concrete building. I would show that the evidence in this case was not impartial, and is not reliable. As evidence that good concrete is not liable to contraction I can instance long ranges of buildings of 12, 20, 25, and over 30 houses of continuous

walling without the smallest sign of a crack anywhere, as there must have been with the smallest degree of shrinkage in the material. I have myself often felt surprised that small settlement cracks have not been much more frequent in monolithic buildings. In a building of bricks, stones or blocks there are a great number of joints, and a settlement is distributed to such an extent by a large number of joints giving way each a little, and no crack appears. The same amount of settlement in a concrete building would inevitably cause a visible crack, but I doubt if the stability of the structure is affected more in one case than in the other. I take leave to say that all this talk of contraction and shrinkage has no real basis. The real stumbling-block to the progress of concrete building is the want of architectural treatment, and when architects have once swept that difficulty away we shall hear no more about shrinkage, inasmuch as provision can be easily made to prevent its occurrence.

To refer now to some of the practical suggestions of Mr. Payne's Paper. The proposal to build the iron supports for the moulding apparatus into the face of the walls, and leave them permanently fixed as part of the walls, will make such walls very costly. The comparative cost may be judged by reckoning to leave built in all the iron standards of the apparatus now used, and which are used for hundreds of buildings in succession; but by Mr. Payne's proposal a new set of iron standards would be wanted for the apparatus of each building. Concrete walls do not require these iron ribs for strength. I fear they would be liable to rust, and would require periodical painting, &c. The building in of iron rods, ties, and trusses into the middle of concrete floors, roofs, and stairs, and for giving additional strength to any special parts of concrete structures, has been long known and taken advantage of. I have been in the habit of using light rivetted trusses instead of girders for floors, roofs, and stairs. Instead of casting each step separately, with an iron rod cast in it lengthwise, and fixing after, like stone, I make the whole staircase a monolith, having an iron truss cast into the concrete at the end near the open string. I have a letter in my hand from an architect now present (Mr. Cole W. Adams), with whose permission I will read what he has said in reference to stairs and floors built by him with my iron trusses:—"The staircases I have every reason to be satisfied with; they have the iron skeleton treads you sent me inserted. Respecting the floors, I have one floor 16 ft. by 10 ft. without a girder which is perfectly rigid, and, in fact, those floors with girders vibrate more." The light iron trusses I use for floors are rivetted bow girders, the string being of light iron, $1\frac{1}{2}$ in. by 5-16 in., and the bow of $1\frac{1}{2}$ in. by 1 3-16 in. angle iron, and these tied at about three feet intervals by short pieces of flat iron, rivetted to both bow and string. The advantage of these light iron trusses over the ordinary girders is that the concrete of the whole floor is continuous, and not in separate slabs as with girders; and these light iron trusses, being completely encased in concrete, are not affected by fire. It is to be regretted that sufficient experiment has not yet been made to teach us the safe loads for various spans and thicknesses of concrete floors. This is an important subject for test and investigation. Experiment should be made and accurate formulæ compiled by which we might learn the strength of flat plates and beams of concrete without iron, and also with iron trusses as described; and also of curved plates or arches of concrete, carefully noting the value of tensile strength of concrete—a fact that does not exist in brick or stone arches. This tensile strength counteracts the tendency to thrust, which has to be provided against by abutments in other methods of arch construction, but which may be obviated entirely in concrete by supplementing with the iron ties the natural tensile strength of the concrete. But it is important to learn at what precise point it is necessary to increase the tensile and transverse strength of concrete plates and arches by building in iron. A few days since a floor, measuring nearly 20 ft. by 15 ft. and 6 in. thick, was tested in order to prove its soundness. It had been doubted if this floor would be found to carry a load of more than 133 lbs. per superficial foot, but

2 cwt. per foot was considered a fair load, and this load was placed upon the floor without any deflection being caused.

Mr. Blashill raised a question on the last occasion, as to the swelling of wood built into concrete walls. I remember his saying the same thing about nine years ago in the room below, and I have gone on building in the ends of wood ever since, without ever once causing the damage to the wall apprehended by Mr. Blashill. The truth is, that when the end of a joist or other timber is built into a wall, the wood takes up the moisture and swells to its largest size before the concrete sets; and the difficulty to be provided against is the shrinking of the wood, which would leave it loose in the wall if not provided against. This we do by driving nails partly into the wood, and leaving the heads of nails standing out for the concrete to grip. We provide in the same way for building in window and door frames, and light bonds for fixing picture rods, &c., and when these get dry and shrink they remain firmly fixed by means of the nails standing partly into the wood and partly into the concrete. Frames fixed in this way require no wood bricks (a very unsound part in ordinary buildings) nor driving of nails through faces of woodwork. Respecting condensation upon concrete walls, I have found no evidence of it upon ordinary plastered walls, I presume, because the plastering mortar is sufficiently absorbent to take in whatever moisture condenses upon the surfaces. On the underside of concrete roofs forming the ceiling of upper rooms I have seen a good deal of condensed moisture; and it would be necessary to provide against condensation in such cases, either by absorbent plastering, by battening, and lath, and plastering, so as to leave an enclosed air space between the plastered surface and inner surface of concrete; or, where the form of roof will permit, by condensation gutters to carry off the condensed water. I remember that on the last occasion the President stated he considered concrete afforded greater facilities for scamping builders than other materials, but I may be allowed to say there is no greater difficulty in keeping a scamping builder in hand with concrete than with any other material. Bind them in the conditions of contract with a liability to have the cement and concrete tested at any moment with the usual tests for good cement and good concrete, and you will have no difficulty in securing good work.

The PRESIDENT.—Can you tell us anything about the cracks in the building at Whitehaven?

Mr. DRAKE.—It was stated by Mr. Banks that cracks had appeared, but I never heard of it before. I heard the statement of Mr. Banks with surprise; and a few days after I met one of our old foremen, whose present work is in the neighbourhood of the concrete chapel where the cracks are said to be. Upon asking him if it were the case that cracks had appeared in the building, he said he did not believe it, as he had only a few days before looked over it, and considered it one of the best concrete buildings, and one of the soundest buildings in Whitehaven. I then requested him upon his return to make a careful examination and let me know the condition of the building. He wrote, saying there are two or three cracks so small as to be scarcely visible, and that these were evidently caused by settlement. In reference to Mr. Banks' statement, that the condition of the building was altered each time he saw it, I believe that to be entirely imagination, and the cause for Mr. Banks' statement merely a personal disagreement upon other matters.

Mr. BANKS, Associate.—I may be allowed to explain, that when I heard the name of Mr. Drake, as the builder of the concrete structure at Whitehaven, which has been referred to, it was a guarantee to me that the wall was as good as it possibly could be, and I conceived that the fault was not in the material but in the principle of using concrete at all for such a building. I still maintain that there are numerous cracks all over the building, which in my opinion are the results of contractions and not of settlement.

Mr. J. TALL, Visitor.—Mr. Drake is known as one of my former managers—one of my followers. I

have studied concrete for 21 years. Mr. Drake has said so much that there is very little left for me to say, and almost all he has said I consider to be facts, with the exception of building joists into the walls. That I have not agreed with for years, and it will be remembered by Mr. Blashill that when I read my Paper below stairs eight years ago I objected to the building of wood into the wall. With regard to the cracks in concrete buildings which have been spoken of, I cannot comprehend how they could have happened, unless it was through the foundations giving way. Many gentlemen present are no doubt aware that Mr. Goodwin has lately been engaged in building in London nine large warehouses at an outlay of not less than £50,000, and if gentlemen will go to those buildings near Blackfriars Bridge they will not find a single crack in them; at the same time if you build on solid concrete made with gravel ballast you will get a little contraction. The first warehouse, which Mr. Goodwin built, was under the licence of the Metropolitan Board, and they specified that no material should be put into the concrete larger than would pass through a 2 in. ring. I need not say we were obliged to see this was done. We had a large quantity of stone brought from stone yards and old boilers from gas works; in fact we had some old retorts and put them into the walls. When the district surveyor came it was necessary that we should use the material of the size stipulated, but as soon as he was gone we put them into the wall, and I consider that was the grandest success of all. (Laughter.) Now, if the licence had been acted up to, and gravel ballast only had been used, the wall would have cracked. Therefore, I consider putting in the large packing made it a success. The building has been examined by architects, and I guarantee you will not find a crack in it; but I confess I dare not build in solid concrete with gravel ballast. With regard to building iron and other materials in combination with concrete, Mr. Drake has taken that subject out of my hands, but up to the present time I have heard nothing as to what is a fit material to build in concrete, and what is the best material for concrete. The materials which I prefer are, firstly, burnt clay ballast, which abounds in all parts of the kingdom; in fact, it is so plentiful that it has been the leading material for brick making for many hundred years, and, being inexhaustible, let us use bricks still, only in another form. Clay, if properly burnt, with the addition of a small quantity of fire coal or breeze, will calcine together in large lumps precisely the same as a clamp of bricks where the heat has been fierce and caused them to run together; therefore this plentiful material furnishes both concrete and necessary packing. Next in the order of materials for concrete, follows clinkers from steam boilers. These, when crushed, come next in importance to clay ballast, but being a little hollow or spongy require a small portion of sand to keep the Portland cement from going bodily into the clinkers and weakening the concrete. Next comes slag from the blast furnaces. This is a most excellent material, because it is easily crushed and furnishes in the crushing a sharp grit. It is necessary to add that the various metals require different treatment. With respect to concrete floors I do not approve of iron in them. I built a house for a gentleman, who is at present residing in it. My first attempt was with an upper floor 19 ft. by 13 ft., without any iron joists; my second attempt was with a drawing-room floor 40 ft. by 16 ft., and I contend that that floor is stronger without iron than it would be with it.

The PRESIDENT.—What was the thickness?

Mr. TALL.—Eleven inches, reduced to $4\frac{1}{2}$ inches in the middle, and I believe there is not a crack or blemish to be found in the whole. Since that time my confidence in the materials I have used in my concrete has been so strengthened that I determined to see how far I could go on constructing roofs sufficiently thin to answer the purpose of a slated and timber roof. My first experiment was on two small dwellings at Dulwich, of which I have exhibited a rough section plan. These roofs were completed last autumn; they have stood the heavy rains and great weight of snow of last winter, and I can positively assert that not a crack or drop of water has made its appearance, but they remain as

sound as on the first day they were finished. On one occasion I allowed the rain to accumulate on the roof till it ran over the parapet walls, and the result so increased my confidence that I am building two more houses of a different class, and I have here to-night not only a section of the roof on paper, but a section of the roof itself. You will observe that there is no thrust on the walls, the roof simply standing on the floor. There are no slates to blow off, no repairs required, being I may say indestructible and everlasting. I will try to convince you that this roof virtually costs nothing. Every gentleman will admit that the room in this dome is nearly equal to a square room, and when I add that the concrete and labour are about equal to carrying up the walls 9 inches thick and 9 feet high, if you agree with me that the room in my dome is equal to a square room, you must also agree that it is comparatively without cost; therefore, with slates at the highest price I have known them for forty years, I claim to have done something to reduce the cost of roofs. I may be allowed to add with reference to the remarks of Mr. Blashill as to the inconvenience and unpleasantness of water condensed by a heated atmosphere dripping from a concrete roof, that is caused entirely by using the wrong material; for, instead of using gravel ballast I employ fine burnt clay ballast without sand, and commence casting my roof at the same time as the foundations are dug out, so that the roof is perfectly dry before it is put on the walls: hence there is not the slightest moisture.

Mr. HORACE JONES.—What is the test of burning the ballast? Do you like it burnt to a clinker, or only half burnt?

Mr. TALL.—The harder the ballast is burnt the better.

Mr. HORACE JONES.—The more dense it is the better.

Mr. TALL.—Yes; we consider ballast when it is well burnt equal to stock brick.

Mr. C. F. HAYWARD, Fellow.—Mr. Tall has pointed some fun at the District Surveyors, but he must be aware it is only under certain specified conditions that concrete buildings may be constructed in London. Thus, as there is a considerable amount of doubt with regard to concrete buildings, even allowing that they are in many cases good when well constructed, it is quite as well, generally speaking, to admit the fact at the outset of any discussion, because it is evident to all that much depends upon the work being well looked after, in fact what building does not? I may mention that the roof for a church at Zanzibar is to be built in a sort of concrete. The building is of the stone of the country which is a sort of rough coral, and the natives put it together with a sort of "chunam," using such lime as they have; and the roof of the church is to be built solid, in the same way in the form of a pointed arch, using Portland cement. The wall will be carried out under the supervision of the Bishop himself. It may, however, turn out to be rather an example of good rubble work than concrete, but, perhaps, I may one day be able to communicate the result.

Mr. R. PLUMBE, Fellow: This question being one necessarily of experience, I may be allowed to mention my own on the subject. Five years ago I built a terrace of seven model dwelling-houses, the front of which formed a continuous wall about 150 feet long. The houses were built of burnt lias, ballast, and Portland cement, in the proportion of six of ballast and one of cement. They were erected by one of the patent concrete builders with an apparatus which bears his name. I have recently seen the work, and I have every reason to be satisfied with the way in which it has stood, and with the approval which this mode of construction has in this case received. The people who inhabit the houses are paying from 9s. to 10s. per week for their suites of rooms, and as they are a class who are very particular in respect to the accommodation and convenience of the houses they inhabit their approbation is a great point gained in favour of concrete building. The floors and partition walls are also built of concrete, and some of the latter are only $2\frac{1}{2}$ inches thick. After they had been up some short time I directed one of the workmen to put his back against the main wall, about 2 ft. 6 in. away

from the thin partition, and, with the purchase thus gained, to try to push it down. I thought he would succeed, but he could not move it. I then tried it myself, but without being able to make any impression upon it, notwithstanding the walls were only $2\frac{1}{2}$ in. thick, 15 ft. long, and 10 ft. high, the concrete being, like the main walls, in the proportion of 6 of burnt ballast to 1 of Portland cement. The Discussion has turned somewhat from the point to which Mr. Payne more particularly directed attention, viz. :—the Architectural Treatment of Concrete Buildings. My own difficulty in this matter is more one of design than of construction, and I regret that the Discussion has gone so much upon it rather than upon architectural treatment. In the case to which I first referred, I endeavoured to obtain effect by using tiles in bands of cement made up with mineral colours and separated with incised lines. It is pretty certain that the generality of builders using concrete for the walls can hardly make them weatherproof. It is, therefore, the practice to cover these houses with cement, so that practically one has to design a cement-fronted house, and there is difficulty in designing a cement front in a way really suitable to the material used. It is about the last thing I would prefer as an architectural material. With regard to the question of cost it is well we should hear both sides of the case. The buildings I have spoken of were designed in brick, and I gave a chance to concrete builders to tender. One builder represented that the work could be done 10 per cent. cheaper in concrete. He took the contract and sub-let the work, and the result was, instead of the building being 10 per cent. cheaper than brick the cost of labour entailed by the use of the concrete builders' patent apparatus was so great that the contractor lost a considerable amount of money by the contract, and he should have had 10 per cent. more for the work instead of 10 per cent. less. Whenever on other occasions I have given ordinary builders and concrete builders an opportunity of tendering for the same works, with liberty for the latter to use concrete, I have always found that those who tendered for building in the ordinary materials have had much the advantage as regards lowness of price.

Mr. H. DAWSON, Fellow.—I think we are in danger of falling into error with regard to this question of the material of concrete. It has been stated in reference to the fire at Messrs. Waterlows' premises that the only material what was not seriously injured by the fire was the concrete. I hope those who were not practically acquainted with the subject will not go away with the idea that this was the material which we ordinarily call concrete. It may be called concrete, but it was of a peculiar composition. It was Portland cement mixed with breeze and ground clinkers, not mixed with gravel or broken stones, and I am quite certain if you try to use a concrete of the latter composition, that is, in fact, with any material which has not been previously calcined, it will fail as a fire proof material. This calcination of the several ingredients of concrete, as a fire proof material, is the key of the whole question. The reason why the lintels and steps and corbels at Messrs. Waterlows' fire did not burn was because they were formed entirely of materials that had been already burnt. I hope therefore we shall bear in mind this important point, or we shall fail in our experiments. I take it also that when we have heard of this fine Portland cement concrete having cracked after exposure to fire, it is because it has had sand in its composition. I do not mean silex chemically combined, but natural sand or some disintegrated stone material mixed chemically, and which when it comes to be calcined is sure to give, and therefore cracks will occur. With regard to the staircases used in the Industrial Dwellings recently erected, the steps are cast in moulds with the same fine material of Portland cement and breeze with ground clinkers, and are superior to those which have an iron string outside or in any part of them, which will certainly cause failure in case of intense fire. I think the same danger applies to the building of iron outside to form a frame work for concrete walls, without reference to the other objections arising from oxydation or the necessity for constant painting.

Mr. DRAKE.—The iron frame is in the middle of the stair. Concrete when coated will conduct

moisture from condensation if coated inside in the ordinary manner. A roof like that exhibited here might be protected against moisture by gutters to carry the water off; but a good many roofs have been constructed of Portland cement concrete, and lathed and plastered inside, and that is found effectual to prevent the condensation of moisture. With regard to the walls the Portland cement concrete is so absorbent that there is no condensation of moisture.

LORD ELCHO, M.P., Visitor.—I came here by invitation to listen to the discussion of a subject in which I am much interested, because every landed proprietor requires to build a good many cottages and farm buildings, and therefore, inasmuch as building costs fifteen to twenty per cent. more than it did some years ago, it is very desirable that we should have some material as durable, and more economical than the ordinary building materials. I have heard a good deal about concrete, and some friends of mine are using it largely. It happens that I was for two months this winter at the seaside, at Seaton, in South Devon, where I found Mr. Brannon engaged in building a tall house and bridge over the river Axe for Sir Walter Trevelyan. The work was not far on when I first saw it, and as it progressed it occurred to me that the minds of architects of this country would be well directed if they bestowed some attention upon this question of concrete building. What I saw shewed the great strength of concrete. Mr. Brannon was building this tall house in a situation where the water flowed under it, and it was therefore built on arches. This suggested to me the desirability of adapting a similar plan with regard to cottages in general, to prevent the bad effects of damp rising from the ground. Nothing is more shocking than to see how houses are built in the neighbourhood of London resting upon the undrained soil with the inevitable result that they must suck up damp and fever; whereas if you place your cottage on a concrete arch it would be impervious to damp, there would be a free circulation of air under it, and great good would arise therefrom. The span of the arches which Mr. Brannon had constructed was in this case about 14 feet, and the thickness at the crown being not more than about four inches, and heavy weights placed on it did not produce the slightest vibration observable beneath it. Mr. Brannon did me the favour also to shew me the designs which he submitted to, and which were adopted by Mr. Penrose for making the galleries in the dome of St. Paul's fireproof, which they were not previously. This plan has had the effect of rendering the galleries to which the public have access, fireproof by the introduction of concrete doors, and particularly with regard to the staircase leading to the balcony. Such a plan as this struck me as being admirably adapted for the additions to the British Museum, and other galleries where it is desirable that valuable public property placed in costly buildings should be effectually protected from fire. Mr. Cates has alluded to the doors at Cannon Buildings, King Street, and I must say I greatly admired them. The panels may be made of any form desired, and they ring like the best bell metal. They are not so heavy as iron doors, and I have seen a model of them subjected to an intense heat, and it came out uninjured. The panels are not more than half an inch thick, and they have all the ring of metal. Iron doors, as has been already said in the course of this discussion, are not an adequate protection against fire, but Mr. Brannon has assured me that these concrete doors will render picture galleries and other places of that kind completely safe against its ravages.

Mr. ROGERS (representing the Patent Victoria Stone Company) said: A sample of the concrete manufactured by the company was in the room, and he described its composition as an amalgamation of clear granite siftings and Portland cement, which is cast in a mould of the required shape, and when sufficiently set is placed in a bath containing a solution of silica, the effect of which, the patentees claim, is to harden the cement to a degree said to be unattainable by any other process.

Major SEDDON, R.E.—If I say anything on this subject, it will be following in the constructive line rather than on the architectural treatment of concrete. I have had a good deal to do with design-

ing and constructing works of a military character for the Government, and have used concrete to a large extent; and the more I use it, the more confidence I feel in it. Still, although I feel that I could rely on any work done by contractors like Mr. Tall and Mr. Drake, who are thoroughly acquainted with the material they are dealing with, I consider that great caution and the most careful supervision is required when such work as concrete floors form part of a general contract; not that I am so much afraid of the work being scamped, as of failures arising from the ignorance of the contractor or his workmen. For instance, dirty ballast would kill the best cement in the market, and fresh burnt cement might be used for the express purpose of ensuring good work; whereas, if too newly ground, it should be spread out upon a dry place for some time in order to get rid of the tendency to expand in setting, which would infallibly lead to ugly cracks and bulging walls. I will briefly state my own experience with regard to the constructive strength of concrete. We have had a slab made 6 in. thick and 14 ft. 6 by 13 ft. 6 clear of the supports, which were four 14 in. brick walls, and after twenty-one days setting, eighty men were marched on to it, who marked time at the quick and double, and then jumped upon it altogether, without having any effect whatever upon the concrete. The whole of the unsupported part of the slab was then loaded with bricks, until an evenly distributed load of $10\frac{1}{2}$ tons was piled up on it, when it gave way suddenly. Comparing by calculation the dead load under which it broke, with the effect of the live load of eighty men jumping upon it, it would appear that could ninety men have been got on to the slab they might have succeeded in jumping through it. This slab was exactly double the size of the unsupported portions of the floors which have been and are still being formed to the Army Stores in many of the new Brigade Depôts. No iron whatever has been used in any of the concrete floors designed by me, as I prefer using iron where I know what work it is doing within certain limits, whereas, when iron is imbedded in concrete, no one can determine the relative proportion of the work which falls to the share of the iron and the concrete respectively. I will take another slab of concrete experimented on, which was made in the same way as that already referred to, namely, with one pint of Portland cement to four parts of ballast gauged through a 1 in. mesh and kept well wet by watering for seven days. This block was 14 ft. 6 in. by 6 ft. 9 in. clear of the 14 ft. brick walls, and 6 ft. thick. After 21 days setting it was tested by forty-five men marking time on it at the quick and double, and jumping upon it without any effect whatever being produced. With a dead load of 15 tons of bricks evenly distributed over its unsupported surface it begun to bend and to turn up at the edges on the wall, and with 32 tons it cracked slightly. It was then loaded up to $43\frac{1}{2}$ tons, or 9 cwt. per foot super, without the appearance of the crack altering, though it had tilted up about 3 ft. 4 in. at the outer edges. A greater load could not be got on it at the time. If the side supports are firm I consider first-class concrete of this description is capable of sustaining almost any amount of compression that is ever likely to be brought upon it; when the compression of the material had come into full play by the cracking of the underside, it bore all the additional loading without any further sign of giving way. I have found roofs of concrete perfectly impervious to water over surfaces of fully 45 ft. square. Where there have not been any great loads I have divided them into three compartments, and in the centre one I have turned a slight arch with about 1 ft. rise in a 13 ft. 6 in. span, and 45 ft. long, and they have stood the whole of the last winter without any signs of wet getting through.

The PRESIDENT.—Have you had any trouble from the condensation of moisture?

Major SEDDON.—Not the least. They are all bone dry inside. With regard to cracking, none of the floors, that I am aware of, have cracked in any way. Some of the roofs have shown a few hair cracks after some months, from which it would appear that some slight contraction goes on in the setting of the material, but not sufficient to let any damp in. The cracks being possibly merely superficial, or such as would be filled up by dust getting in. I cannot say for certain that there has

been any contraction in the mass of the concrete composing our floors, although some of them have been laid over areas of 45 feet square, all in one operation. Possibly, as the cement goes on hardening there may be a slight contraction, for there is no doubt that some chemical action is going on during the process of hardening, whilst considerable alteration may be taking place in the mechanical arrangement of the particles, as they tend to crystallize or to group themselves round definite centres of attraction; but I believe, conscientiously speaking, you can trust properly prepared concrete to any reasonable extent, and if architects find this to be the case, we shall probably find more gentlemen coming forward with suggestions as to the best methods of treating the material artistically.

The PRESIDENT intimated that unless it was the wish of the Meeting further to adjourn the Discussion it would be his duty to call upon Mr. Payne to reply, but it was for the members to express their feeling on the subject.

Mr. T. ROGER SMITH, Fellow, then moved the adjournment of the Discussion till the 29th inst., which was unanimously agreed to.

Before the Meeting broke up, LORD ELCHO mentioned that the question of the construction of buildings, with a view to security against fire, would shortly be considered by a Committee of the House of Commons, and he ventured to suggest that the Institute should appoint a committee to deal with the subject. It was one on which he felt sure the House of Commons would be glad to receive a report from the Institute.

The PRESIDENT observed that the Institute had a Standing Committee on "Materials and Construction," by whom the subject might be taken up.

The Meeting then adjourned.

LETTER FROM MR. EDWIN CHADWICK.

The following Communication has been received and ordered to be appended to the Discussion :—

Park Cottage, East Sheen, Mortlake, S.W.

May 15, 1876.

MY DEAR SIR,

I regret my inability to attend and hear the Discussion at the Institute of Architects, and offer testimony as to the sanitary and other qualities of Portland cement concrete for house constructions and connected town drainage works.

My attention was first directed to it by the late lamented Captain Fowke, of the South Kensington Museum; and on his close examination, and my observation of what he had done with it, I recommended its use, and many cottages have been built with it in different parts of the country without any failures of which I have heard.

In the first place, the concrete, with about a seventh of Portland, has only about one-fourth the absorbency of wet of the common brick constructions, and this proportion may, I expect, be further reduced. This is a great gain in sanitary quality, in the reduction of damp. As it is, however, houses of this construction may be safely occupied in a fourth of the time that it is safe to occupy first-class houses of the common construction.

In some proportions concrete walling is open to the objection to which window-glass and glazed tile facing is—of the condensation of moisture on the surface, which is confounded with damp arising from *transudation*. With variations of the admixture of the Portland this inconvenience is avoided, as

in cottages of the sort of that I showed you and Mr. Roger Smith, at my gardener's lodge. You there saw completely washable walling, abolishing the sanitary evil designated by French hygienists of the *mephitism des murs*. But Mr. Robert Philip Pope is now building two concrete cottages for my neighbour, Mr. Frederic Wigan, which will, I expect, display considerable improvement in concrete construction—namely, of a concrete hollow wall, by a simple method, which will give the means of leading warmed air in any direction desired, and that may effect a restoration of the Roman warmed floor and the Roman warmed wall. The walling on this principle may, he expects, be constructed at about 5d. or 6d. per cubic foot where suitable material is available, or at about one-half the present price of the common brick walling.

Gentlemen who overlook sanitary qualities object to concrete construction for what they call its roughness. In this respect, however, I do not see that it has any disadvantage over the stucco-faced West-end houses; but by admixtures of the Portland with chalk and colouring matter, permanent facings, exterior as well as interior, may be given in different colours. You will have seen inside my lodge a good red granite colour, a yellow, a French grey, and a black. These, I have no doubt, may be improved upon for application—at least so thought my lamented friend, Owen Jones—and light and cheerfulness given to our first-class edifices beyond any that is achieved with the common materials.

I observe that it is objected that fissures are apt to occur in the ordinary concrete constructions. So they are, by expansion and contraction of the ordinary material by variations of temperature, at regular intervals of some thirty or forty feet, with common concrete. Where the materials have not been properly mixed, and under some conditions, there are air-cracks in the facings. But these defects are of little importance, and, with care, they are preventible. With care, the concrete constructions are, for very long lengths, monoliths, and save the defects and multiplied jointings of common constructions. In this respect Mr. John F. Grant, of the Metropolitan Board of Works, who has, perhaps, the largest experience of any one in this country in the use of concrete, has found it enables a superior construction of sewers at a reduced price. I expect that, from its exactitude of form in setting, and from the smooth, impermeable surface obtainable with it, and the reduction of joints in long lengths, it will be found available for house-drains as well as for sewers. When Mr. Grant first began to use Portland cement its quality was very unequal, and he found it necessary to test every barrel; but I have been informed by him that its manufacture has been so much improved that the guarantees of respectable houses may be relied upon. With it you may make what may be called moulded stone, half as strong again as the common building stone, and of double the strength of common bricks.

Such are the general results of my observation and information, as respects the material, to be obtained by the use of Portland; and somewhat similar are the results hitherto observed in respect to General Scott's celenite.

With the late Mr. Samuel Sharp, architect, who had well mastered the primary uses of concrete, I went over the new dwellings for the wage classes erected on the Shaftesbury Park, which he closely examined, and he concurred in the conclusion that they might have been constructed of concrete and celenite, of a superior sanitary quality, at one-third less of price.

This reduction of the price of the walling will afford for the higher class of houses the expense of improved art ornamentation.

Yours truly,

William H. White, Esq.

EDWIN CHADWICK.

Royal Institute of British Architects.

At the Ordinary General Meeting of the Institute, held on Monday, the 29th of May, 1876, CHARLES BARRY, President, in the Chair, the Discussion of Mr. A. PAYNE's Paper, read on the 10th of April, 1876, was resumed, the subject being

CONCRETE AS A BUILDING MATERIAL.

The PRESIDENT.—At the request of the author of the paper I would mention that his great desire is that the artistic questions involved in the matter placed before us should be dealt with a little more than was done on the two evenings which have already been devoted to this subject. At the same time, it is so practical a question, that it is perhaps difficult to avoid discussing it in that aspect.

Mr. JOHN P. SEDDON, Fellow, said that he intended to make a few remarks bearing mainly on that view of the subject. Having to build a mansion in the South West of Ireland, the only builder he could get to erect it would do so only upon conditions that it should be of concrete, and with outer walls of only 9 inches in thickness. It was some time before he consented, as his employer desired masonry of the beautiful and abundant stone there. It was proved to him, however, that it was the only material really available in consequence of the absence of skilled labour, and that, further, it was the only one that could be relied on to exclude completely the wet at a reasonable cost in that extremely damp locality. He examined numerous concrete cottages built in the neighbourhood, and finding them all bone-dry he satisfied himself upon these practical points. It then became the question how to make the building pleasing in effect, as his employer desired. The means adopted were, with the less important parts to panel the walls with roughcast upon which creepers could grow, and to stamp in the roughcast panels various patterns finished in smooth cement. Then for the principal façades sunk panels were left, into which slabs of mosaic could be introduced flush with the surface, the rest of which would be skimmed with coloured cement. Mr. Seddon said he had had some specimens of this kind of mosaic made at a very moderate cost by Mr. Rust, brought for exhibition that evening, the tone of which was excellent. Messrs. Salviati had also sent some richer, but more expensive samples of their mosaic suitable for the same purpose. He conceived that with such method concrete buildings could be made really beautiful and artistic at a moderate outlay. Mr. Rust's slabs, for instance, cost about £2. per yard, and occupied but a small portion of the whole surface of the building, the greater part of which would naturally be left plainer as a contrast. From his experience in Ireland he had found that it was quite immaterial whether the materials used for the concrete were salt or not. In fact, they were hauled directly from the wet sea beach with not the slightest ill effect after the exterior had been skimmed with cement. As regards the fire-resting quality of the material, he could state that blocks of it had been sent through lime kilns and come out as sound as they had been put in, which was a pretty strong test. His remarks on these points, however, applied only to concrete made with Portland cement.

Colonel LUMSDEN, Visitor, said :—I have had some experience in concrete building, having heard of it first from Mr. Tall, who has devoted many years of his life to it. I was induced to try it under the impression that I should find it a cheaper and better material than stone and lime. The locality in which I tried it was on my own estate, Pitcaple, Aberdeenshire. We have a wealth of stones and stone quarries in all directions, and in most places large quantities of gravel (a very important ingredient in concrete, as well as in other modes of building), and for that reason I thought it would be worth while to try it. I did so first on cottages. I was in hopes to have received from my manager facts and particulars of cost, with drawings, &c., but they have only partially reached me, owing to the short time which has elapsed since I knew of this discussion. The most important concrete work I did was an addition to my own residence—one of the old Aberdeenshire castles, to which my father considerably added about fifty years ago, the whole being a stone and lime building. The addition I made four years ago was 51 feet in length, 33 feet in width, and side works 20 feet high, and was added to a portion of the old building, with a circular tower 11 feet in diameter at one, and a hanging turret at the other of the corners furthest from the old building ; also dormer windows, with crow steps and crow-step gables. All party wall and interior gables for fire-places, floors, and plate-safe (a large recess in pantry), gun room and furnace room, with lean-to roof in court yard outside the measure given ; also concrete floor beneath wooden floors in three rooms in other parts of the castle : also, in gun room and furnace room roofed with cement concrete, and court paved with it—cost as follows :—

Foundations :—Excavating and levelling, and breaking stones for foundation	...	£ 15
Building	... ..	65
Quarrying ballast	... ..	20
Carters' wages	... ..	7
Carpenters' wages	... ..	28
Timber used in forming voids	... ..	20
Cement	... ..	170
Plasterer	... ..	25
		<hr/>
		£350

The estimate I had for this work from a mason in the neighbourhood was nearly double this sum, and the success of that particular building was completely shown by the cost, and also by its proving perfectly comfortable as a residence in every way. The hanging turret I have referred to as placed at one of the square corners is at the height of the first floor from the ground, about 6 feet in diameter, and 8 or 10 feet high, exclusive of the pinnacle roof, about two-thirds of the circumference projecting beyond the walls and the remaining third merged in the corner, apparently supported by corbels, and was planned to make the new building correspond architecturally with the old. The way in which it was built shows the strength of the concrete. We had circular frames, of two-thirds the circumference of the tower, made on Mr. Tall's principle, 18 inches in depth, and these frames were in the first instance put up clasping the corner, and supported by posts of wood, with flat wooden boards laid on to retain the concrete, and upon that the turret was built. It was about 10 feet high, and the diameter, as far as I recollect, about 6 feet. It was built upon these wooden supports and the boards placed upon them. It was slated, of a kind of pinnacle shape, like the turrets of the old castle, and there was no tie whatever by which the turret was attached to the main wall except the concrete. It was built up in this sort of way :—It was like two-thirds of a circle, the ends coming round the square corner and projecting beyond it. After the lapse of a week the supports were taken away, and, with wall, 9 inches thick, and the roof, it stood, without corbels beneath, or any other support. The corbels were

then cast in concrete in a mould on the ground, and stuck on afterwards with cement, the strength of the Portland cement doing the whole thing. It seemed to me almost incredible, but it was done, and that turret is just as secure as the other part of the building. The walls of the additions up to the joists of the first floor were 15 inches thick, and above that 12 inches. I may state that the mixture used in the walls consisted of one portion of cement to six of gravel (of the size from a small pea to a hen's egg, all finer than the former sifted out) and the casting of the walls outside consists of about $\frac{1}{2}$ of an inch mixture of equal proportions of Portland cement and fine sand; or, perhaps, about three parts of the former to five of the latter, and that coating makes a concrete wall perfectly dry and impervious to wet. In building cottages where I have had the cementing of the outer walls done by contractors I have found them occasionally let in damp, but that I attribute entirely to the contractor putting less cement into the mixture than there ought to have been. I am quite certain where a proper mixture in the proportions of one to one is coated on to the thickness of $\frac{1}{2}$ of an inch the walls of a concrete house can be made as dry as any walls can possibly be. With regard to the outward appearance of concrete walls, my old castle is what we call in Scotland *harled*, and I found the concrete took the *harling* as well as stone and lime, and presented afterwards exactly the same appearance. With regard to skilled labour I may say I found, as the last speaker stated he did in Ireland, that it was by no means required. What I did in my case was to send my forester (who knew nothing practically about building) to London: he went to Mr. Tall, and was a week with him, and has been doing my building ever since:—cottages and walls, floors, roofs, &c., besides the addition to the castle for the last four years. He simply employs two or three ordinary labourers (in the addition to the walls he had six) whom we get at 17s. a week, and in that way I am able to erect concrete buildings, as I calculate, from one-fourth to a third less than the same work could be done in stone and lime in Aberdeenshire at the present time. I find that concrete ground floors are most excellent. In constructing them we put in first about 6 or 8 inches of stones like road metal, and then a mixture of concrete in the proportion of 1 of cement to 6 or 7 of ballast is put on the top, which filters through and fills up the interstices of the stones and forms a level surface, and on the top of that we put a skin of the same mixture used for coating the outside of walls—viz., nearly equal proportions of cement and fine sand, and we find that that makes a floor which when once dry is wholly impervious to damp. It takes a few months to get thoroughly dry. I may add that I have not yet used concrete for floors except for ground floors, although I believe that has been done in some cases. Mine have been only ground floors and cellars, and floors of barns, &c.

The PRESIDENT enquired whether £350. covered the whole cost of the addition spoken of.

Colonel LUMSDEN replied, the whole of the concrete was covered by that sum—all the work that would be done by a mason only. He wished to add that he had personally no interest in building, and that the cause of his coming to that Meeting was the suggestion of a friend who thought his experience of the result of concrete building might be of some use.

Mr. E. W. TARN, M.A., Fellow.—Some years ago I took a great interest in this matter. I visited several concrete buildings in course of erection, and also built some houses myself with concrete. My experience is rather against it for private houses, and I think we all ought to be guarded how we take the statements of those gentlemen who have patented apparatus for concrete building, as we shall, I think, find a considerable amount of exaggeration in them. Looking over some papers, I found the prospectuses of two different inventors, and in both the terms used are almost identical—*e.g.*, “the advantages of concrete walls over brickwork are, amongst others: Half the cost of construction; ten times the strength (that is rather strong, I think); and imperviousness to wet and damp. The walls being a solid mass, sound is completely deadened.” I think we have sufficient contradiction to this last statement in what we have heard from Mr. Seddon this evening, and everybody knows that

according to the hardness and solidity of the mass, so will be the capacity for transmitting noises. From a personal experience of five years, I know what it is to live in a concrete house. I also take this statement from one of the prospectuses: "It does not settle in parts, like brickwork, as there are no joints to compress." Again: I was informed by one of the patentees that a warehouse, 60 feet high, was built, some years ago, at the rate of £3 10s. per rod, compared with £12 per rod for brickwork. Now there are about twelve cubic yards in a rod, which would give about 6s. per cubic yard for concrete walling. The regular price of concrete foundations is about 13s. per cubic yard; so that in this case we are asked to believe that walls 60 feet high can be carried up at less than half the price of ordinary foundations. Then, again, as to the cost of construction: an inventor asserts that it is only one-half or two-thirds that of brickwork. The walls I built were 9 inches thick. I found the chief cost was the labour of putting up and taking down the patent apparatus. The filling in the concrete was a trifling matter, and you have to wait till the concrete is partially settled, and sufficiently solidified to allow of the apparatus being removed. That has been my experience with thin walls of 9 and 14 inches. Where you have to make strong walls, 2 or 3 feet thick, like the rubble walls in Yorkshire, concrete is, no doubt, a valuable material, because the cost of putting up and taking down the apparatus is just the same in the case of a thin wall as a thick one. I found the cost was greater, having to buy and cart ballast in the neighbourhood of London, and not having it on the spot. At Folkestone, and other places on the coast, you can get the ballast for the loading, and in that case concrete is economical; but when you have commonly to pay 3s. or 4s. a load for ballast it is more expensive. As to concrete having ten times the strength of brickwork, I don't think that requires much talking about, for in that case we must accept that a concrete wall 12 inches thick is as strong as a brick wall 10 feet thick. That we know is not the case. With regard to the walls being impervious to wet and damp, I have seen concrete walls soak up moisture from the subsoil to the height of 2 feet from the ground where a damp course has not been put in, which would appear to be particularly necessary, because capillary attraction draws the water through the pebbles just like a sponge, and I have had to put tinfoil round to prevent the wall-paper being stained with the damp. As to keeping wet out, it was said the walls did not require to be rendered with cement in order to keep the wet out, but was only done to give the work a smart appearance. I laid a ground floor 4 inches thick with cement and ballast and burnt clay, and tried to make a good work of it. Before rendering it with cement, I had a bucket-full of water thrown on the floor, and as soon as it was thrown down it went through like a sieve. I have tried concrete roofs; and, on the subject of shrinking, I would state that in the case of a roof 13 feet long and about 7 feet 6 wide, I put in two or three T-iron joists, and at every one of those T-irons there has been a crack ever since. That, I consider, is from shrinkage in the concrete. That roof has been rendered over with cement again and again, but the shrinkage appears to be always going on. I made some partition walls of concrete, and they have shrunk from the main wall a quarter of an inch or more. There has been no settlement, but the small cracks extend in all directions. I see there is one in the concrete arch exhibited in this room; and that is what I have found to be the case with concrete, and the shrinking appears to be constantly going on. That is one reason why I think concrete is not suitable for ordinary dwelling houses; but for warehouses, &c., with extremely thick walls, and using packing if you like, it is a very useful thing if you can get good ballast handy and cheap. I have found it is only at certain times of the year you can build properly in concrete. I began to build one house in November: the frost came on, and it crumbled to pieces; and the walls had to be pulled down. The concrete would not set quick enough in wet weather, and the frost completely disintegrated it. Where you have a good thick wall, with packing, it amounts to a rubble wall, as used in the stone districts of Yorkshire and elsewhere. I think, as I have already said, concrete is a good material, if

properly made, for the thick walls of warehouses, &c., but for ordinary dwelling-house walls, from 9 to 14 inches thick, I do not think it is cheaper, but as a general rule it is dearer than brickwork, because the walls must be rendered with cement to make them waterproof. It is not a question of decorating concrete, but decorating the cement. Mr. Seddon's plan, which he has explained to-night, is, no doubt very good, but it simply amounts to colouring, or rather painting, in cement.

Mr. EDMESTON.—What were the proportions of your concrete?

Mr. TARN.—I have generally used a rather strong concrete gauged in the proportion of one of cement to six of ballast of sharp gravel mixed with burnt clay; but it is very important that the clay should be thoroughly well burnt; if not, it is apt to crumble up. The stuff you get about London is scarcely suitable for concrete building, though you have to pay a good price for it. The slagging costs about 2s. per cubic yard, and the burning about the same, which makes it come to 4s. per yard. With regard to the transmission of sound in concrete houses I can corroborate what Mr. Seddon has stated. If you tap on the wall at the ground floor level you can hear the sound very distinctly on the second floor, and you can hear your next-door neighbours talking very plainly.

Mr. J. EDMESTON, Fellow.—There is not much to add to what has already been said, and yet we appear to get information the longer we talk about it. I think a great deal of the soundness of concrete depends upon the material used. As far as I have had experience I have not become acquainted with this cracking and shrinking; where you have the gravel and ballast close at hand concrete building is about one-third cheaper than brickwork. I have used sand and shingle from the sea shores and that dredged from the Thames, employing Portland cement in both cases. A house that I built six or seven years ago (the partition walls as well as the exterior wall being in concrete), has never shown any shrinking that I know of. At the same time I can quite understand why it should shrink if proper care is not exercised with regard to the concrete, as you may get hold of a material which will blow and play all sorts of tricks. I do not understand the benefit of putting lumps of stone and clinkers into the walls, although having had to pull down some walls built in this way by Mr. Tall I know that they were very strong and only demolished with difficulty and much expense; but when concrete is made with clean ballast and Portland cement it becomes, according to my observation, equally strong and as solid as a rock, and so hard that it has to be split up with wedges and sledge hammers. It is the adhesive quality of the cement which gives the strength, and I do not think there need be any fear whatever in building in concrete when it is done properly, and in the cases I have instanced the houses were built without the patented apparatus. There is a description of concrete which has not been mentioned, of which not much is known, though samples of it have been exhibited at South Kensington and elsewhere. It is made with asphalt and gravel, and is applicable for the bedding of steam hammers and other heavy machinery. It deadens the vibration, and has been proved to possess very superior qualities for the purpose. With regard to flues, I have built them lined with brickwork and without, and as far as I know the fire has no prejudicial effect whatever upon the concrete, and one mode is as good as the other. The material is undoubtedly very strong, and when properly manipulated I believe it to be a perfectly safe construction, and where you have not bricks or other material at hand I think it is the right thing to use—its comparative economy depends entirely on locality.

Mr. E. WOODTHORPE, Fellow.—A remark was made by a gentleman at the last meeting which struck me as very strange. He said (speaking of concrete building) "We had a large quantity of stone from stone yards and old boilers from gas works; in fact, we had some old retorts and put them into the wall. When the district surveyor came it was necessary to use the material of the size stipulated, but as soon as he was gone we put them into the wall, and I consider this was the grandest

success of all." Now, as a district surveyor of considerable experience, I can assure that gentleman, this is a dangerous practice. Of course, I am acquainted with the regulations of the Metropolitan Board with regard to concrete building in London, and I regard them as being quite necessary; but however good the material may be, my own experience in concrete is that its success depends in a very great degree upon the care and attention with which the work is carried out, and a constant supervision over the workmen. The danger of concrete is in the poor class of buildings which we have in the east of London and sometimes in the west, and strict supervision over them is necessary; but when a public boast is made of cheating the district surveyor it is too disgraceful a matter for an Institute like this to entertain.

Mr. T. CUNDY, Fellow.—The practical question is whether concrete construction is really adapted for cottage building throughout the country. I would ask Mr. Edmeston whether he thinks such a mode of construction throughout the country generally—not speaking of special localities—whether such a class of building in the hands of the great mass of country builders and others would be likely to be cheaper for that portion of the building which is proposed to be in concrete?

Mr. EDMESTON, Fellow.—In both the instances I alluded to country builders did the work. I should say the concrete *per se* would be a considerably cheaper material than brickwork in first cost, but if you have to coat with cement afterwards you might find bricks cheapest.

Mr. CUNDY.—Brickwork we know is a very general mode of construction throughout the country, and is a readily obtainable material in almost every district; whereas concrete made with a particular kind of cement which has to be brought a long distance is rather costly. As a general mode of construction I do not think it could be adapted to cottage building with good effect.

Mr. JENNINGS, Fellow.—It appears this discussion comes very much to the question of pounds, shillings, and pence. It is very difficult to go much into the question of ornament excepting as to the matter of expense of ornamentation. I thought we were to have heard some account of carving in cement work, which I understand is done with advantage and at less cost than carving in brick or stone. I have no experience in carving myself, but my experience in the use of concrete has been that in most places it is a more expensive material to use than bricks. Where individual gentlemen personally superintend the work and where it is properly done, I have no doubt there are many places in which it may be economical; but at the present time and with the present builders I am sure it would cost more than it would to build in brick or in wood, which, after all, is in many places not a bad material for building; the lower part being built of brick and the upper part of wood, covered with weather tiles or cement. I know many buildings of this description which have been in existence for two hundred years and are now in good condition, and I scarcely think any concrete building can be constructed at less cost than these. An interesting fact has been mentioned in the use of sea sand in the manufacture of concrete. I was surprised to hear that the sea sand has been successful for building walls, unless battened to keep out the damp. I have always found it necessary to batten walls on the south coast, exposed to driving rains and winds. I have observed at Biarritz that all the sand intended for building was thrown up in heaps previously to being used, and allowed to remain for a year or two to get thoroughly washed, and I did not observe any dampness in the walls there. With regard to the use of Portland cement concrete, the experiments which have been made show that the strength of the material is proportionate to the quantity of cement used, so that when we talk of the strength of a concrete wall, it is a question of the amount of cement employed; and being a material well burnt if it is used with other materials which have either passed through fire or will stand fire, I suppose it is the most perfect fire-proof material we can have; I believe no material will stand fire which has not been previously naturally or artificially calcined. As to shrinkage, I am satisfied that arises

from fault in the working. I agree as far as concrete is now used by itself there is no necessity for shrinking, but when used in combination with iron, which is more or less affected by temperature cracks may occur, not from the concrete shrinking but from the iron and the concrete not expanding and contracting in the same proportion. Experiments have proved that properly made concrete will not shrink or expand. It was thought it would expand in setting, but these experiments show that is not the case.

Mr. G. REDGRAVE, Visitor.—A wish has been expressed that our attention should be directed more especially to the artistic treatment of this material. Whatever may be done subsequently in the way of decoration, we must I think take it for granted that in the construction of the building some form of mould must be used, and this appears to necessitate stucco-treatment as an external finish. If this be the case, and there is no alternative but that concrete buildings should be coated with stucco, I think that this must be considered a serious drawback. Mr. Payne has directed our attention to some of the methods of decoration doing away with a plain stucco surface, and there are several other plans which have been proposed, viz., the breaking up of the flat surfaces by means of rough cast, applying metal stencil patterns to different portions of the walls, and embedding various materials in the works. Another plan is by forming patterns of different coloured cements as in sgraffito work, which may be seen at South Kensington, and which was originally carried out there fourteen or fifteen years ago. The material used in first instance was Portland cement, coloured black, and over this a thin coating of Portland stucco was applied. Representations of eminent artists were executed in this way on the walls of the Sheepshanks gallery. These decorations stood very well for some years, but after a time moisture got in between the two coats of stucco, and a great part of this ornamental work scaled off. There seemed to be deficient adhesion between the Portland cement external surface, and the coloured background. Latterly some further experiments have been tried with this form of enrichment by the students in the Art Schools at Kensington, and the New Science Schools and Music Schools were decorated in this way, the materials used in both cases being selentic cement, which appears to be admirably adapted for this treatment. The danger is that this kind of ornamentation is so easily applied and can be so readily spread over large surfaces, that you are liable to get the appearance of floorcloth on the front of the building, but I think there is no reason why this system of decoration should not be taken into consideration in the original design of a concrete building. Mr. Payne proposes to use tiles by way of enrichment, retained in a position by a species of dovetail. The danger here seems to be that the water running down the wall would lodge on the top of the tiles and form little streamlets, and these would drop and cause a stain.

There is a system of concrete building with L-shaped tiles, in which the whole surface of the building is covered with tiles, the bottom of the L being turned up against the face of the wall, but this can hardly be considered a legitimate treatment of concrete. Mr. Matthews expressed an opinion, a few days ago, that concrete would be the building material of the future for London. If that is so we must find some means of treating it in a decorative manner, and any mode of ornamentation of the nature of appliqué work, or depending merely upon the power of adhesion, seems to me to be going on a wrong principle.

Mr. COLE A. ADAMS, Associate.—I should like to add my experience of some concrete floors I have lately constructed. I have given, for some time past, attention to this subject, and in order to gain further information, I went amongst others to Mr. Drake with respect to a specification for concrete floors. These plans have been made eight or nine months, and to-day previous to this meeting I went to make an examination to see how far they justified the trust I had reposed in them through the recommendation of Mr. Drake. I examined them carefully, and I could not detect a crack or shrinkage in any of them. I consider them perfectly satisfactory. The largest of the floors is

12 feet 6 by 11 feet 6, with no iron girders. They are 6 inches thick and rest $4\frac{1}{2}$ inches on the walls. I have jumped upon them, producing only a vibration, and these floors have been carrying the traffic of workmen, and heavy weights on them ever since. I believe the whole secret of the success of concrete is in the careful mixing of the material and proper supervision in its use. It is of the first importance that the cement should be obtained from good makers, and that the ballast or other materials should be clean and free from loam; the concrete may be poured in by unskilled workmen with a careful foreman to look after them. I am but young at present in the use of concrete, but as far as my experience goes I am perfectly satisfied with it. I have only had one failure of a concrete floor, which I account for from the fact that loam and dirt were mixed with the ballast, and that it was built in the winter time; also I do not think the cement was good; that is only a proof of the necessity for great care in this work. With regard to the decoration, I think there is a very simple form for houses and cottages which need not be costly. I have tried it myself. It is simple sgraffito work with lines and simple bold scrollwork, or stencilled pattern and diapers, the cost need not exceed 2s. per superficial yard for the labour upon it. Another form of decoration might be adopted with slabs of flint or diapers somewhat like the mosaics exhibited in the room. These might be fixed to the uprights, and the concrete then poured in, thus forming the moulds for the walls, &c. This decoration might be done in various ways either in flint work, pebbles, or variously coloured granite, &c., similar to the pavements at South Kensington, and this method could I think be carried out at very trifling cost.*

Mr. BROUGHTON, Visitor.—I have brought here a section of a concrete floor, 50 feet long by 12 feet wide, in which there is no iron work of any description. That is perfectly sound. The thickness is three inches at the crown and eleven inches at the springing, and is now carrying an immense weight, of machinery and men working on it. Another section I have brought is that of a balcony projecting four feet from the wall; that is 50 feet long, 3 inches thick at the extreme edge, and 11 inches at the wall. Twelve days after it had been built the centering was struck, and three men ran along it. That balcony is supported entirely by the adhesion of the Portland cement concrete. The proportion at the wall being 1 of cement to 4 of ballast, and in the other parts 1 to 6. This balcony is supported entirely by the adhesion of the concrete to the wall of the house by merely scraping off the smooth surface of the cement, and without any insertion into the wall. The floor to which I first referred is a portion of a warehouse, erected with my patent appliances, at Lawson Street, Great Dover Street. The third drawing is a warehouse erected from my own design at Southwark Street, London Bridge. I have tried to treat that building artistically, with terra cotta medallions, panels, string courses, &c. and it has an effective appearance; and though the cubical contents of that building amount to 430,000 feet there is not a crack about it. The roof is also of concrete.

The PRESIDENT.—May I ask where the building is?

Mr. BROUGHTON.—The first building referred to is in Lawson Street, Southwark, opposite to my own offices. The balcony is at my own house. The large warehouse last referred to is in Southwark Street, London Bridge. The concrete house I live in has 60,800 cubic feet contents, and I have no wish to live in a brick house again. Some of the walls, recessed to $4\frac{1}{2}$ inches and 6 inches thick, are

* It escaped my memory to speak of the stairs I have had cast in concrete with the skeleton iron string or truss of $1\frac{1}{4}$ in. by $\frac{1}{4}$ in., designed by Mr. Drake, and framed as a section of stairs; this is completely bedded in the outer edge of each flight of steps, the iron running quite across the landings and into the walls top and bottom. These staircases I am quite satisfied with. They were adopted principally for fire-proof purposes; they have been put to the rough use of workmen, and we have had no accident of any kind with them. They were cast in position rest $4\frac{1}{2}$ in. on the walls one side, and are 4 in. thick at the junction of the tread and riser.

exposed to the south-westerly gales, but there are no signs of damp. With regard to temperature, the rooms are much warmer than those of brick houses. I have not had, through the winter, fires in the bedrooms, and I have not had a doctor in the house since I have been there—which is three years. I have just received a letter from an important engineering firm in Sheffield stating that they are erecting walls of concrete with my patent appliances, and that what formerly cost £24 for labour in rubble work they were now getting done for £12, having the material of furnace slag at hand. A good deal has been said about shrinkage of concrete in which wooden joists have been moulded; I have seen no such signs of shrinkage whatever. Twelve months since I put in one building 500 joists, moulded in the walls, and there is no sign of a crack, and I cannot see how it is possible to split the wall. If the joists expanded the concrete would compress them, the concrete would not certainly split. Upon the pedestal I have shewn a block of concrete with the joist moulded in; this was made on the 16th of May last, and on the 24th of May last I allowed it to remain in a steady rain for twenty-four hours, consequently expanding the timber joist as much as possible. Yet there is no sign of a crack in the concrete so recently made. As to concrete conducting sound, if you leave all the doors open you would hear every sound through the house; but if you close the doors you cannot hear the sounds from room to room. The floors are not concrete except the basement, and the house is built upon that.

Mr. EDMESTON: How many stories high is the warehouse referred to?

Mr. BROUGHTON.—Six floors with the basement. The first floor only is concrete. The exterior walls are concrete from top to bottom.

Mr. EDMESTON.—Are there any cracks in them?

Mr. BROUGHTON.—I have never seen one, and as for condensed moisture, there is nothing of the kind. In reply to further inquiries Mr. Broughton stated that the balcony he referred to was put up twelve months after the house was built. In putting it up only the stucco on the surface of the wall was cut away, and the balcony was held in position solely by the adhesion of the Portland cement concrete.

Mr. F. P. COCKERELL, Hon. Sec.—There is some conflict of testimony on a variety of points. The first one is on the question of damp. Mr. Tarn says concrete does not keep out damp, inasmuch as a concrete wall, which has no damp course, is damp to a certain height. On the other hand, Mr. Broughton says a wall of $4\frac{1}{2}$ inches will stand any amount of driving rain without any covering. These statements may, I think, be reconciled to a certain extent. No doubt concrete, if made solid, will, like any other granulated body, draw up damp if it is continually in contact with damp earth. The more dense the concrete, or in other words the more regular the granulation, the greater will be the capillary attraction. If the concrete is, as in my opinion it should be, a honeycomb formed of hard and unabsorbed lumps, connected together at incontinuous points of contact by a comparatively unabsorbent material, the capillary attraction is reduced to a minimum. As, however, the proper formation of the concrete can scarcely be guaranteed throughout, it is no doubt unwise to dispense with a damp course. As regards penetration of weather the same principle applies. The wet which lodges in the coating will not draw through the wall; but if there is no coating the water naturally lodges in the crevices of the concrete, and runs freely through. I have found that walls which let the water through quite freely before being rendered, have become quite dry by the application of ordinary lime, roughcast. With respect to the cracking of concrete, I have built several houses and seen no cracks; but where we come to great lengths of garden walls I have found cracks occur with great regularity at almost equal distances. I looked at a wall the other day running round three sides of a garden, about 300 yards in the whole, and there were cracks occurring with great regularity fourteen or fifteen feet apart. I do not think that is to be avoided in a long wall. I believe, however, that the cracks, if properly

stopped after some months, when the setting action of the cement has completely ceased, will not open again.

Mr. ADAMS.—Might not the wall have been in separate portions of that length?

Mr. JENNINGS.—Might not the subsoil have been affected by moisture?

Mr. COCKERELL.—I thought it was settlement at first. The cracks occurred at regular intervals all along. There was another wall of the same kind on a sloping piece of gravel, but there was a difference in the subsoil in the two cases. In the one it was gravel bottom and a loosish loaming sand on the top; the weight of the wall was nothing. The fact of the cracks occurring at such even distances I think dispels the idea that they arise from subsidence of the ground.

Mr. HORACE JONES.—The measure of non-contractibility would appear to be about fourteen or sixteen feet.

Mr. COCKERELL.—It contracts in a small degree, and it would appear beyond a certain length it would not hold without contraction.

Mr. WYATT PAPWORTH.—There is the question as to whether it is requisite to use any particular proportion of water in making the concrete. In these cases I should almost think too much water was used, which might account for the cracking.

Mr. G. AITCHISON, Fellow.—As a constructive material, no doubt, concrete is excellent, inasmuch as the whole construction of the Romans was done in concrete or packed concrete. I believe with the Portland cement we have the means of making a stronger material than the Romans. The Romans found concrete consistent with all kinds of external decoration. We have somewhat of their skill in construction, and we can hardly be more deficient than them in artistic skill, for I presume Roman art is about on a par with Dutch courage. As to the suggestion of Mr. Payne, that iron can be usefully applied in combination with concrete, I must say I am of a different opinion, particularly when the iron is exposed to external or internal influences. Where it is completely embedded in concrete it may be different; but I am confident that the different contractibility and expansion of iron and concrete cannot make sound work. Mr. Tarn spoke about cracks in a concrete roof on iron girders. I have not used concrete for house building, though I have used it largely for retaining and other walls; but I have found, in cases where stone has been laid on iron girders, both exposed to the open air, it was impossible to keep the joints water-tight, although every expedient was tried to make them so; therefore I believe, where wrought-iron is used in conjunction with concrete in positions where the iron can be affected by temperature, it cannot answer. It was said by the late Mr. James Walker that no building ever failed except through the badness of the materials and workmanship. If the best Portland cement and all the other materials of the best description are used, I have no doubt concrete is a most excellent constructive material. Mr. Leach, the engineer of the Thames Conservancy, informed me that he took ballast from the river and threw it under the weirs, and after being well washed there it was thrown in heaps on the shore, and when dry it became perfectly white; and with that he formed blocks of concrete with a proportion of 1 of cement to 9 of ballast, with which the works at different locks have been built; and he tells me these concrete blocks answer as well as the best stone—and, where the sand is free from admixture of clay or mud, it will, no doubt, answer equally well. I think, where small pieces of iron are used to give additional tension to the concrete, it would be well if we could have some experiments tried with and without the iron, to show whether any or what additional strength is gained; and with respect to those domes which Mr. Payne spoke about, in which rods or rings of iron were placed, the Government might be memorialised to allow some experiments to be made in this matter at one of the dockyards, in order to demonstrate whether the iron affords additional strength or not. As far as the decoration of concrete is concerned, I believe ordinary stucco or plaster decoration is that

which must be used ; but in better class buildings tile or some glazed material should be used, and it seems surprising that this has not already been tried. Embossed stone-ware tiles, such as Doulton's, and mosaic patterns in tiles or glass, would seem to afford a very excellent medium of decoration suitable for our large smoky cities, and I hope some gentlemen amongst us may have the opportunity afforded them of doing this on a large scale in London. A palace in Berlin (Prince Bismark's, I believe) is faced with the unglazed paving tiles, the window dressings are of majolica, and the frieze of glass mosaic.

Mr. ARTHUR CATES, Fellow :—Mr. Penrose had intended to have been present this evening, and to have explained the course he has adopted for protecting the cupola of St. Paul's from risk from fire ; but as he is not able to attend, and as I enjoyed the advantage, a few days ago, of visiting the cupola under his guidance, and hearing on the spot his explanation of what he had done, I will endeavour to state in a few words what I saw. The external cupola of St. Paul's is formed by a system of timber framing, which rests upon the brick cone forming the immediate support of the lantern. This timber framing and the boarding upon which the lead covering is laid, are of course very dry, and exposed to great risk of entire destruction in the event of fire being communicated to any part, either by accident or maliciously. The staircases by which visitors ascend to the lantern and ball pass through this forest of timber framing, and the accumulations of dust, fragments of paper, and combustible rubbish, made the risk of fire arising from carelessness or evil intent exceedingly great—probably a single spark might have led to the destruction of the most beautiful cupola in the world. The course taken by Mr. Penrose was to isolate one section of the cupola, and confine the public visiting the lantern, &c., thereto, and then to protect all the timbers, so that they should be inaccessible to fire. The section thus appropriated comprised four bays, or five trusses of the roof. The two extreme trusses were filled in, or rather faced, between the outer cupola and the brick cone, with Mr. Brannon's "stone felt," or what we should call concrete—a material similar to that of which he makes the doors mentioned at the last meeting—thus completely cutting off the rest of the cupola from this section. The necessary doors of access are all formed of the same "stone felt," and nothing of a combustible nature is employed. The under side of the cupola, below the rafters and boarding on which the lead rests, was also lined with the same material : thus, with the side enclosures, the brick cone, and the stone floor, securing a complete isolation by fire-resisting material of this section of the cupola. But there still remained the three intermediate trusses, the timber framing of which was traversed by the staircases referred to. These trusses are of oak, of large scantling, but required protection not less than the other timber work : this Mr. Penrose has obtained by casing each piece of timber with Brannon's concrete material, so that each is completely surrounded thereby, and the trusses have the appearance of monoliths rather than of timber framing, and in this section of the cupola there is not any combustible material whatever visible ; and it would appear that a great fire might be lighted there without risk of injury to the construction or to the other portions of the cupola. Of course Mr. Penrose placed great reliance on the fact that the timbers were thoroughly dry, otherwise so to encase timber would have been at the least a hazardous proceeding. I examined the whole with great care, and it seemed to me to be as complete a protection from fire as it was possible to devise. The appearance was thoroughly satisfactory, and the system may be applied, in similar circumstances, with great advantage.

The PRESIDENT.—Was the casing done with the material in a liquid state ?

Mr. CATES.—It was done in a similar manner to the doors to which I alluded at the last meeting—run in liquid on the spot ; applied upon iron wires strung up to form a core. In our so-called fire-proof constructions, the weakest point is the failure of the iron girders to resist the action of heat. Mr. Whichcord, at the National Safe Deposit Company's building in Queen Victoria Street,

has used terra cotta casing to protect the iron girders, and the result of the experiments he detailed when he read in this room his description of that building showed that such protection was of great value. And, looking at the work executed by Mr. Brannon at St. Paul's, it seems to me that a casing formed of similar materials might be applied to iron girders more readily than the terra cotta used by Mr. Whichcord, and that the result would be even more satisfactory—always assuming that the material possesses the fire-resisting power which Mr. Brannon claims for it. Mr. Brannon informed me that it has been tested with complete success. Moreover, Mr. Penrose told me that he had seen a cottage built by Mr. Brannon, filled with combustible material, in a state of fierce ignition, and while the interior was so filled with a raging fire he had walked about on the roof, and the heat passing through the walls, which were thin, was but trifling. I understand that this cottage has been so burnt out six or seven times, and that it remains undestroyed, and is, in fact, indestructible by fire. Thus Mr. Brannon's material, in my opinion, affords us the opportunity of securing that protection against fire which the iron girders we use so certainly need, and by which a building attacked by fire would have a better chance of resisting it than one in which the girders were unprotected. I hope the whole subject of Mr. Brannon's material, as applied at St. Paul's, and its further suggested application, will come under the consideration of our Committee on Materials and Construction now sitting, as it appears to merit the closest investigation.

Mr. A. PAYNE, Associate (the author of the Paper): I am much surprised at the direction the discussion has taken. As mentioned in the Paper, I had thought the strength and dryness of properly made Portland cement concrete would be conceded by most of the speakers in this room. I had, therefore, directed attention chiefly to the architectural treatment of the material. But a discussion extending over three evenings has been principally occupied by the most varying testimony as to the suitability of concrete for ordinary building purposes at all. Some five speakers have averred that concrete is wet, condenses water, shrinks, cracks, and contracts: while ten declare that it does not condense water, does not shrink nor crack, nor take up damp; and in most cases this varying experience can be entirely accounted for by the different character of the concrete employed, which, like most other things, may be made either good or bad. From the increasing use of concrete it is evident that a portion of the public will use it; and for those architects who would have nothing to do with it, there seemed to be no alternative but that they should pass on any client who has made up his mind to build in concrete to some architect who will employ it. Without attempting to go through the several speeches at this late hour, I will take up briefly the topics which have been brought before us; and I may mention that after the first evening's meeting I wrote to different gentlemen who had had a good deal to do with concrete, and I put a series of questions in connection with the different points raised, in order to get the result of their experience, and the replies embrace an experience extending over upwards of ten years, and comprising upwards of 400 buildings done in Portland cement and other concrete, amongst which are houses, cottages, warehouses, schools, theatres, baths, hospitals, hotels, barracks, engine-houses, &c.

FIRST, WITH REGARD TO CONDENSATION OF MOISTURE AND SHRINKAGE.

All the experience I can collect testifies that the concrete houses are warmer and dryer than brick or stone ones, and that they can be safely occupied much sooner after erection than the latter. No doubt naked concrete walls will condense moisture,—so will naked brick or stone; but in either case the difficulty can be overcome by the ordinary plaster rendering on the interior of the wall. If we are to reject every material that condenses moisture, we must reject brick, stone, glass, marble, &c.,

&c. It is rather curious to notice that the only example brought forward as proving the inconvenience of concrete in this particular, by Mr. Blashill, turns out not to have been constructed in concrete at all, but in tiles.

We next come to the question of the strength of concrete, and its liability to shrink. With regard to shrinkage, the remarks of several gentlemen referred to concrete not made with Portland cement, but with lime, which is not fair to bring forward as a proof that shrinkage takes place in all concrete. Whilst on the other hand we have the testimony of builders of hundreds of houses that in Portland cement concrete, properly manipulated, there is no shrinkage whatever; though there are examples of Portland cement being used too new or too light, and thereby causing cracks. Mr. Giles states that the cementing material he used was blue lias lime, which, though an excellent material, is known to undergo considerable changes in bulk in setting; and the sea wall Mr. Nash referred to at Bognor was built of sea shingle and *lime*. I don't think the cracks that take place in Portland cement concrete walls will be found of more consequence than the settlements and shrinkages which occur in brick walls. Mr. C. Fowler, Mr. Brannon, Lord Elcho, Major Seddon, and Mr. Plumbe, all give invaluable and conclusive evidence of the strength of concrete, which I need not repeat. I have seen retaining walls, on railways and elsewhere, from a quarter to a half a mile or more in length, such as those on the North Kent, between Lewisham and Woolwich, and I have seen no instance of the cracks at regular intervals which have been spoken of. In Paris and elsewhere sewers and aqueducts, many miles in length, have been constructed in concrete, which would certainly have been very leaky if concrete were always as porous and liable to crack as some speakers have represented.

WITH REGARD TO RISK OF FAILURE IN CONCRETE.

We cannot afford to pass over the remarks of so experienced an architect as Mr. Charles Barry, who says with perfect justice that if concrete fails (as often used) it fails suddenly and disastrously. We have had no definite instances of such failures brought before us in the discussion, but such as have come under my notice have invariably been consequent on subjecting the material to a strain and risk that no one would dream of subjecting any other material.

For example, instances were brought before us last evening of floors about 16 feet by 14 feet, and 6 inches thick of concrete made perfectly flat, with no joist or tie. Who would like to construct such a floor in the hardest stone, joggled, jointed, and united with the best cement? And I may refer to the section of a roof exhibited by Mr. Tall, which is in reality a continuous arched vault, extremely thin, without any abutment, and the counterpart of the first vaults built in the middle ages, which we know fell down in almost every instance. I may almost mention the balcony explained by Mr. Broughton to us to-night. Now, owing to the extraordinary tenacity of Portland cement, these daring and unscientific structures may stand, perhaps, for nine hundred and ninety times, but there comes the thousandth time, when, owing to some flaw the concrete is deprived of its usual tenacity, a slight crack takes place, and perhaps a fatal accident results, and everybody shouts out against concrete; whereas, if any other material had been used the structure would not have stood an hour. And had the concrete roof been provided with abutment or tie, or had the floor been supported at reasonable intervals, or been disposed as a vault, the cracks might have occurred without danger. Surely it is entirely wrong to reject a useful material because it sometimes gives way, when subjected to an unreasonable and quite unnecessary strain.

With regard to concrete offering opportunities to builders for scamping, I think there is much to be said on the other side—unless the builder is a man of straw with nothing to lose—for the following

reasons : It will be presumedly put in the specification that if any failure takes place during progress of work from bad materials, the builder must make it good at his own expense. Now one of the great peculiarities of Portland cement concrete is that it gains strength immensely with age. In two years its strength will be more than 100 per cent. greater than when first put up, so that a builder knows that his concrete building will be subjected to the most severe test during the time he is building, and the owner knows that if it stands when just complete, it will be double as strong in two years.

WITH REGARD TO USING TIMBER AND IRON IN CONNECTION WITH CONCRETE.

An opinion has been expressed by some speakers that the use of timber with concrete would be dangerous, but I think no single instance has been brought forward as to any mischief having resulted from the combination ; whereas the evidence on the other side of its having been used without harm is abundant. In America, floors have been made of ordinary wooden joists bedded in concrete. In the way that I proposed to use woodwork it would serve more the purpose of forming a framework for the concrete, and adding to the facilities for ornamentation, than as adding much to the strength of the structure, and any shrinkage that might take place in it, would not have sufficient power to split the concrete, but, as some speakers have remarked, would tend to make the wood clasp the latter more powerfully.

With regard to iron, I think the evidence in the discussion is very conclusive as to its successful employment with concrete. On the other hand Mr. Aitchison and Mr. Nash, and Mr. Giles, C.E., seem to have doubts as to the advisability of using the two materials together, and the latter gentleman says he is astonished at the proposition to build a structure composed of iron and concrete. I must confess to being rather surprised at such an expression of opinion coming from an engineer, considering that in modern engineering no materials have been more successfully used in combination, and in such a position that failure from shrinkage on the part of concrete would be fatal. I should think that the bridges might be counted almost by hundreds where the foundations are formed of thin iron cylinders, by no means able of themselves to carry the enormous weights put upon them, but merely acting as a skin for concrete filling. What would be the consequence if the concrete were to shrink and leave the weight to come upon the skin, not thicker than a boiler plate ?

The next question is the subject of economy. As far as my own experience goes I will confess that when I first used concrete for walls I did so, not from any particular liking for the material, but simply because I found a considerable economy could be effected thereby—generally about 10 per cent. on the cost of the building—and this economy results not only from the less cost of the walls, but from things which may be omitted in a concrete building which would be necessary in brick, such as wood lintels, hollow walls, large abutments, &c. ; but I am bound to say that I don't think I should have found such an economical result if a large sum had been paid for the loan or purchase of some of the elaborate patented concrete building apparatuses now in use : I have invariably done without them.

Mr. Drake alluded to the method shewn on the wall of leaving permanent iron uprights in the wall as being very costly. Now the whole of the arrangements for framing the concrete in that building will not amount to more than about £30. I don't think Mr. Drake would have cared to supply on loan his apparatus for the walls of that building, which extends a considerable distance from the street, at the same amount.

A further difficulty arises when you have to adopt any of these apparatuses to a complicated plan ; they are all very well when you have straight walls and right angles ; but when you have to adapt them to

a plan like this, the trouble and labour involved in merely altering, arranging, and adapting, the apparatus becomes a serious expense. Whereas, I need scarcely affirm to gentlemen in this room, that to make a light skeleton building of any required design, in either wood or iron, is not either a difficult or expensive matter, and anyone who will look into it may soon satisfy himself that to fill up such a framework with concrete would not be expensive, as very thin walls would suffice. Of course the framework would require painting when the other external iron or woodwork of the structure was painted, and this must be added to the cost.

With regard to incised work, I am sorry that more has not been said about it in the discussion. Some objections have been raised: 1st, on the ground that the concrete would adhere to the moulds. 2nd, on the score of economy. With regard to the first no doubt there is some difficulty, and a strong tendency in the Portland cement to adhere to many substances; but that it can be overcome is proved by the various blocks and architectural features exhibited, composed of concrete moulded as suggested. With regard to economy, of course the ornamentation cannot be done for nothing, and no doubt finer materials must be used for the facing. But nevertheless, incised work in concrete is one of the most economical methods of ornamenting a building that can be introduced. Mr. Redgrave would have been right about the dove-tailed shape given to the edges of the tiles forming a channel to collect water, if left as shewn on the section; but the elevation shews that the space between the tiles is filled up with ornamental stucco, to which the tiles form a key, leaving the finished surface flush. Mr. Seddon was one of the few speakers who dwelt on the ornamental part of the subject, and I was glad to see the mosaic exhibited by him. I think much might be done by using mosaic in connection with concrete; in a vault, for instance, they might be laid on the centering, a Portland cement front being poured over, and then the concrete, so as to render them part of the structure.

In conclusion Mr. Payne directed attention to some specimens of letters incised in concrete, and also to some ornamental designs for the construction of concrete walls resembling the open timber work of mediæval houses, and consisting of shallow boxes of open 3 in. by 1½ in. framing of ornamental design in front, and filled with concrete. When fixed these were as compact as stone, and afforded an easy way of forming a building in separate parts of trifling weights, which could be sent to any part of the country ready to put into the building, the concrete filling being added afterwards.

The PRESIDENT, in closing the discussion, said,—I think I was quite justified in saying, when I opened this discussion at the request of Sir Gilbert Scott, then President, that concrete building had a future before it. I adhere to what I said on that occasion, but it seems to me the discussion has at any rate brought out this conclusion—That without great supervision and care in the selection of the materials, the benefits ascribed to concrete building do not exist. As to the application of concrete we have had some interesting examples, but they have been very conflicting, as Mr. Payne has in his reply pointed out. The question of cost has been dealt with, more or less satisfactorily, by several speakers, but the only single case of perfect comparison was that of Colonel Lumsden, who had told us that he built in concrete for £350 a structure that was estimated in stone and brick at more than double that sum. That is valuable information as far as it goes, but belongs only to one locality. There is one thing I would like to say, by way of advice to the believers in concrete as a building material, and that is, *not to claim too much*. They seem to me all inclined to do so. That somewhat daring experiment of the balcony mentioned by Mr. Tall is an instance in point. Now any exaggeration in introducing a new material is sure to throw discredit, induce disbelief and hide its real advantages, and I think our concrete apostles are apt to fall into that error. Mr. Payne sums up the question by stating that by taking great care in the supervision of the work and not using the patent apparatus, he believes there is an average saving of 10 per cent. in concrete buildings. I hope with greater knowledge of the

subject, more economy than this may ordinarily be obtained. The conclusions I would deduce from all we have heard are these. They are four in number: First, *as to its fitness*—as a building material it would appear to be peculiarly fit where the materials are at hand, and other materials are not at hand with the same convenience. Secondly, *as to the cost*—we are even now much in the dark as to the real comparative cost with the other materials we ordinarily use. Thirdly, *as to its durability*—this evidently depends entirely on the quality of the materials used and careful supervision during the building; and, fourthly, the last point is that which Mr. Payne takes so much interest in, viz., the means of fitting *decoration*. This would seem, from what we have heard of the difficulty, or cost, or impropriety of projecting or indented features, to be necessarily of some superficial character, and that this may be managed very well and with several decorative materials, I do not doubt, if in artistic hands. I quite think it is undesirable in using concrete of ordinary character to try to imitate features appropriate to other building materials, though not to it. It is better to admit and realise the peculiarities belonging to it as a material than to endeavour to give it a character which it does not possess. I am, however, quite sure that however divided the opinions may be with regard to the merits of concrete buildings, their fitness, cost, durability, or suitable decoration, it will be your pleasure to accord an unanimous vote of thanks to Mr. Payne for one of the most interesting Papers I have ever heard discussed in this room.

The vote of thanks was unanimously passed, and the Meeting adjourned.

ERRATA.

In Sessional Paper, No. 13, containing the first Discussion on Mr. Payne's Paper, "Concrete as a Building Material," in the report of Major Seddon's remarks—

Page 236, line 26, for 6 ft. thick, *read* 6 inches thick.

„ „ line 31, for 3 ft. 4 in., *read* 3 or 4 inches.

Royal Institute of British Architects.

At the Closing General Meeting held on Monday the 12th of June, 1876, the President,
Mr. CHARLES BARRY, in the Chair.

The preliminary business of the evening having been concluded, the President proceeded to the

PRESENTATION OF THE ROYAL MEDAL.

GENTLEMEN,—

You are no doubt aware that our distinguished Honorary Member, M. Joseph Louis Duc, has come expressly from Paris to receive, in person, the honour which Her Majesty Queen Victoria has awarded to him at the recommendation of this Institute, and which he has assured us he duly appreciates. He is present here to-night, and I propose to address a few words to him before placing the medal in his hands.

MONS. DUC AND HONOURED COLLEAGUE,—

As President of this Institute it becomes my duty to address you a few words, and I would in the outset bid you a hearty welcome to England, and rejoice with you in the special object which brings you among us.

There has been happily a brotherhood of artists in all ages, even when countries were practically divided from each other. Freemasonry did a useful and encouraging work in this respect, and it would be indeed a reproach to us if now with ready means of communicating thought, and with further easy means of personal communication, that such brotherhood and sympathy one with another were not largely increased. Amid the vicissitudes of an artist's life and his many anxieties this knowledge that there is this sympathy supports him in his trouble and animates him to exertion, and our struggling talented brother feels that he is one of ourselves. The great dead too are still with us labouring as it were with us and giving us examples and encouragement.

As indeed the laws of beauty by which real art can alone be judged have existed unchangeably, and will doubtless ever be the same among cultivated minds and tastes educated and trained to understand and apply them, so may this unity of thought knit together the artists of this and future ages not only as artists but with the ever warmer personal sympathy which our human nature so much longs for.

Sir, it is my duty and also my pleasure to be the medium of conveying to you a distinguished honour on the present occasion, and it is an honour which I believe to be nearly unique in its character. It is conferred directly by the Sovereign, the fountain of all honour; but it is so conferred on the advice, and with the good wishes of your equals and rivals in art in this country. Although the Royal Gold Medal is placed unreservedly at the disposal annually of the Royal Institute of British Architects, and although it is the summit of the ambition of all of us here to deserve and receive it, the Architects of England, worthily represented by this Institute, animated, I rejoice to think by the sentiments I

have attempted to express, have desired that every third year at least they will look abroad, and by recommending Her Majesty to bestow it on a foreigner, show the desire to know and be known, to honour and be honoured, by those who strangers to them in country and language are yet their dear brethren in art as embodied in our noble profession.

Your title to this distinction, Mons. Duc, needs no description from me, yet it is a pleasure to all of us to remember that among our honoured ones is the distinguished Architect of the graceful Column on the Place de la Bastille, and we remember also the talent of the man who could carry off the Grand Prix de Rome in 1825, the Decennial prize of several thousand pounds, given (in 1869) by the late Emperor, and who has directed and restored the buildings of the Palais de Justice, and whose unselfish love for his art prompted him to devote half of it to prizes for the encouragement of young Architects.

This medal of honour was established by our Sovereign in the year 1848, and I think, Sir, it will perhaps enhance the feeling with which you receive it to find yourself one among the little band whose honoured names have been made known to you, many of whom have passed away and live only in our memories and esteem. And of the others who are still among us, all whom absence or illness did not prevent, are I believe here to welcome you to-night.

The PRESIDENT having then formally presented the Royal Medal to M. Duc, that gentleman replied as follows :—

Permettez moi, Messieurs, de m'exprimer en Français ; je sais que dans votre pays ma langue est comprise de tous les *gentlemen*.

CHERS CONFRÈRES,—

J'ai été extrêmement touché de la nouvelle qui m'annonçait que le Royal Institut des Architectes Britanniques avait présenté mon nom à votre gracieuse Reine pour m'accorder sa médaille d'or. Mes œuvres, en vérité, ne pouvaient me donner la pensée d'être désigné pour un tel honneur et je suis très fier et bien heureux de voir mes travaux couronnés par l'approbation de votre société. Vous le savez, Messieurs, on n'est jamais bon juge de ses propres œuvres, pas même de celles de son pays ; il faut qu'elles soient consacrées par le jugement des nations étrangères et le vôtre est pour moi d'une grande valeur. Je reçois donc un suprême honneur par le don de cette médaille et certainement mes compatriotes prendront leur part de cette récompense.

Les nations peuvent être rivales lorsqu'il s'agit de conquêtes et d'intérêts. Aujourd'hui, sur ce point, la France, après de dures épreuves est bien désintéressée et, si elle tourne ses yeux sur une partie du continent, elle confesse son infériorité dans l'art de la destruction. Elle se replie sur elle-même et elle désire rester sur le terrain des arts et de la paix. Dans cette voie, chers confrères, nous pouvons unir nos efforts pour montrer à tous les peuples de la terre comment les arts, et en particulier l'Architecture, peuvent honorer une nation. Nous lions pas qui parmi les gloires de l'antiquité, l'architecture est la plus juste expression de leur grandeur et de leur supériorité. Regardez comme exemple cette infirme partie du globe qu'on nomme la Grèce et, prenant à témoin ses monuments et les trésors de votre musée, voyez de quel éclat brille cet art si parfait qui rayonne toujours sur le nôtre et sur notre goût.

Aussi, s'il est permis de dire aujourd'hui que la force prime le droit, jamais, je l'espère, l'art ne sera primé par la barbarie et on peut affirmer que les nations qui s'y seront illustrées auront droit au respect et à l'admiration de la postérité. Dans ce but, chers confrères, unissons les qualités qui nous distinguent particulièrement. Nées chacune avec un tempérament différent, nos deux nations, par l'union de leurs dons naturels, peuvent produire une création parfaite.

Ici, chers confrères, permettez moi une comparaison qui chez vous peut être acceptée sans être accusé

ERRATA.

In Sessional Paper, No. 15, page 256, for 1st paragraph as it stands, *read*:—"Your title to this distinction Mons. Duc needs no description from me, yet it is a pleasure to all of us to remember that among our honoured ones is the distinguished architect of the graceful Column on the Place de la Bastille, and who has directed and restored the buildings of the Palais de Justice. We remember also the talent of the man who could carry off the Grand Prix de Rome in 1825, the Decennial prize of several thousand pounds (in 1869, given by the late Emperor, but whose unselfish love for his art prompted him to devote half of it to prizes for the encouragement of young architects."

d'irrévérence. Dans votre pays, producteur de la plus belle race chevaline, vous n'oubliez pas sans doute quelle part y a apportée le croisement des races, celles de l'Orient et de la Normandie. Qu'il en soit de même pour notre art ! Vous, Messieurs les Anglais, vous apporterez les solides et brillantes qualités de votre race, la grandeur et la hardiesse de conception ; une liberté et une puissance d'exécution qui semble grandir en raison des obstacles ; j'ajoute une indépendance toujours modérée par le sentiment du vrai et du naturel ; enfin un goût distingué qui n'est pas sans affinité avec l'art Grec. Nous, Français, nous apporterons nos traditions d'école et d'ordonnance classique, justifiées par une longue suite de belles époques, et puis ce grain de fantaisie qui caractérise l'esprit Gaulois.

Voilà, je crois, chers confrères, les éléments d'une bonne et profitable association. Espérons que par nos relations de plus en plus intimes et par des emprunts mutuels, elle produira de brillants résultats et s'imposera à l'estime du monde entier.

Je porte mes humbles remerciements aux pieds de votre gracieuse souveraine ; je fais des vœux pour la santé de votre illustre Président et pour l'union des Architectes Britanniques avec les Architectes Français.

M. Duc then resumed his seat amidst the hearty applause of the Meeting.

The HON. SECRETARY announced that he had just received the following telegram from Paris, conveying the same sentiments of brotherhood which had just been so admirably expressed by the President and M. Duc:—"Les Architectes Français réunis en Congrès à l'Ecole des Beaux Arts envoient leurs félicitations unanimes à M. Louis Duc et remerciements confraternels à l'Institut Royal Architectes Britanniques, à l'occasion de la Royale Médaille d'or de cet Institut décernée ce soir même à leur honorable confrère."

The PRESIDENT then presented the Soane Medallion and other Institute Prizes awarded to various Competitors for the year 1875-76, and having addressed a few remarks to the Members and other gentlemen attending the General Conference of Architects, called upon the Secretary—Mr. Eastlake—to read his Paper.

AN HISTORICAL SKETCH OF THE INSTITUTE,

By CHARLES L. EASTLAKE, Secretary.

MR. PRESIDENT AND GENTLEMEN,—In attempting to give a sketch of the history of this Institute, whose members and friends are assembled in so large a proportion to-night, and with which I have had the honour of being officially connected for the last ten years, I must preface my remarks by reminding you that it is *but* a sketch, and that to record with anything like fidelity the career of a Society which has existed for nearly half a century, would be to fill not a single number, but a volume of our Transactions with details which, however interesting to you individually, would be tedious if presented as a whole. I shall, therefore, content myself with a rapid survey of the rise and progress of the Institute, describing as briefly as I can the original objects of its foundation and the extent of their development, the schemes which it has entertained for protecting and promoting the interests of our profession, and the work which it has accomplished in that direction. I shall endeavour to point out the causes which have been conducive to its prosperity, and the difficulties with which it has had to contend. Finally, I hope to explain the mode and manner of its administration as at present organised; and if in conveying this information I haply succeed in enlightening some of our professional brethren who are present to-night as visitors, and who have a somewhat vague idea of what the Institute is, as compared with a still more indefinite idea of what it ought to be, my Paper will have served its modest purpose.

The earliest corporate association formed by the followers of our art it would be difficult to name. It probably existed in common with other ancient guilds during that golden age described by a certain Quarterly Reviewer when the “Master Workman” flourished in all his glorious independence. But coming down to more modern times, perhaps the first Institution formed by professional men with aims and objects similar to our own was that of the *London Architectural Society*, established in 1806. This Society had a President, four Vice-presidents, a Treasurer and Secretary. It included in its ranks Ordinary and Honorary Members. The former were required by its rules “to produce annually, according to rotation and time agreed on, an architectural design never before in any way made public, and accompanied by observations, critical and explanatory, under forfeiture of two guineas; also an Essay, under forfeiture of half-a-guinea.”

The object of the Society’s meetings, held once a fortnight, was to discuss the designs, observations, and Essay above mentioned, and every member absenting himself for two successive nights incurred a fine of five shillings, unless prevented by illness or a distance of 10 miles (an excellent rule, which I venture parenthetically to recommend to the notice of our Finance Committee as a legitimate and, perhaps, fertile source of income). The designs and Essays remained the property of the Society, who published such as they thought worthy of that honour, kindly presenting the author with two copies for himself.

The proposal of new members by nomination paper and the subsequent election by ballot, resembled

the forms still adopted by this Institute. The *raison d'être* of this Society is given in a preface to their first volume of Transactions, where it is stated that

“ Among the Institutions so liberally established in this City there is not one calculated for the encouragement of Architecture. The feeble protection afforded by the Royal Academy can hardly be deemed an exception. The lectures have long ceased and medals privately distributed, and the use of the library for a few hours one day in the week, at a time when it is hardly possible for a student of Architecture to attend, cannot be deemed of much value.”

Thus we see that even in the early days of the present century architects conceived that they were neglected by the R. A. The list of members included many names which are well known at the present day in connection with our profession, such as Ashpitel, Beazly, Billing, Elmes, who wrote the “ Life of Wren” and other works, Peacock, Savage, Taylor, and Joseph Woods, the well-known author, and Editor of the fourth volume of Stuart’s “ Athens.”

How long this Association existed I have been unable to ascertain, but it probably became extinct some time before the formation of the *Architectural Society*, which was instituted in 1831. The primary objects of this Society were stated to be “ the advancement and diffusion of architectural knowledge, by promoting the intercourse of those engaged in its study, the ultimate desire being to form a British School of Architecture, with the advantages of a Library, Museum, Professorships, and periodical exhibitions.” For this Society all persons who had studied the profession of architecture in the office of an architect for five years were eligible as candidates. The rules provided for the admission of Honorary (foreign) Members, Amateurs, and Students under 21 years of age. The Council consisted of eight members, besides a President, two Vice-presidents, a Treasurer and Secretary—to be chosen annually—Mr. Thos. H. Wyatt being among the first of the Vice-presidents. The general meetings were to be held on every alternate Tuesday, beginning in November and ending in June. A Curator was appointed to take charge of the Library and Museum, and, judging from the fact that he was to be elected every three months, we may assume that the office was honorary.

The President (Mr. W. Barnard Clarke) and many other members, presented casts and books, to which, under certain restrictions, the students had access at the Society’s Rooms in Lincoln’s Inn Fields.

In January, 1834, we find that a Meeting of Architects and Surveyors was held at the Freemason’s Tavern for the purpose of forming another Society “ *for the Study of Architecture and Architectural Topography*.” Some difference of opinion seems to have been expressed at this meeting as to the objects of the proposed Institution, and the condition of its membership. The consequence was a secession, and certain of the gentlemen present agreed to hold another meeting at the Craven Hotel. This resulted in the appointment of a committee consisting of Messrs. P. F. Robinson, Kendall, Goldicutt, Fowler, Donaldson, Donthorn, Noble, and others, who were requested to draw up a scheme for the formation of an Institution calculated to uphold the character and improve the attainments of the Architect.” At a subsequent Meeting Messrs. Barry, Basevi, Burton, Cresy, J. Gwilt, Hardwick, Kay, Lee, Sir J. Rennie, Papworth, Robinson, Seward, and G. Taylor were elected as original members.

Here, then, we have the nucleus of that Society which was afterwards known as the Institute, and, subsequently, as the Royal Institute of British Architects. Of its later coalition with the Architectural Society, or, rather, with certain members of it, I shall speak hereafter; but to the various arguments for and against that coalition—the pardonable rivalry which seems to have existed between the two Institutions and the expressions of personal feeling which it elicited, I shall not refer. Such details would have but little interest for the present generation, and had best be buried in oblivion. It will be well, however, to remind you that in, and at the outset of, their endeavours to establish the Institute its Founders had to encounter numerous difficulties; that they met with frequent and long-sustained

opposition from more than one quarter ; that many members of the profession held aloof—as some will at the present day—from various motives, and had to be won over by arguments and persuasive proselytism which must have taxed the ingenuity and tired the patience of those who undertook the task. But they went on bravely—this little band of architects, and by degrees their labours were rewarded. Recruits came in from here and there, and their numbers increased with cumulative power. Petty jealousies died out in time ; trivial objections were answered or explained away ; personal considerations disappeared before the more important object of professional integrity, and the Institute became a fact.

As we glance down the list of its original members, and recollect that two and forty years have passed away since they first incorporated themselves for the purpose of accomplishing their laudable object, we shall not expect to find many who have lived to see the present development and extension of their scheme. The elder Kendall, Papworth, Robinson, Goldicutt, and others, to whose individual exertions the Institute is indebted for its earliest organization, are gone, but among the veteran survivors who were elected in 1834 we may still note the names of Thomas Bellamy,* Decimus Burton, and Professor Donaldson. It was the object of these gentlemen and of others with whom they were associated, to secure for the earliest members of their Society architects of prominent position and unimpeachable character, educated for and following their profession as an art, and free from those conflicting relations with trade which in the early part of this century certainly did exist in some instances, and prevented that implicit confidence on the part of the public which should enable a client to regard his architect not only as his agent, but as his friend and adviser. The rules for professional practice then drawn up, and which formed the basis of those still in existence, secured this fundamental object, as far as it is possible to secure it by such means.

With regard to other qualifications for membership, the hard and fast line which it was at first found necessary to draw has been modified of late years. But it must be remembered that in the early days of this Society, that honourable and eminently useful calling, which has since attained the dignity of a profession, was in its infancy, and its true position had not been realized. Few who remember the class to which the “Builder’s Measurer” then belonged, would have recognized in it a prototype of the modern “Quantity Surveyor.” I should not have alluded to this subject but for the fact that it occupied considerable attention at the very birth, so to speak, of the Institute, and that the question whether or not surveyors should be admitted as members formed a point of contention between the Society of British Architects and the Society of Architects and Surveyors, with whom an alliance was sought. Except on this point, the reports of the two committees appointed to confer with each other nearly corresponded. After several meetings, much discussion, and more correspondence, a certain number of the original, though junior society, were elected members of the Institute. Sir John Soane contributed the sum of £750 towards its funds ; and the Medal, which still bears his name, was founded in acknowledgment of his liberality.

Earl de Grey, an amateur of considerable cultivation and artistic taste, was chosen as President, and Messrs. Donaldson and Goldicutt were appointed the first Honorary Secretaries. Rooms were engaged at 43, King Street, Covent Garden, better known as Evans’s Hotel, a building said to have been designed by Inigo Jones, and celebrated in later, though still classic days, for songs and suppers, which have been immortalized by Thackeray in his description of “The Cave of Harmony.”

There the first general meeting of members was held on the 15th of June, 1835, though, strictly

* After this Paper had been read, the sad news of Mr. Bellamy’s death was communicated to the Meeting.

speaking, the Institute was founded in the previous year. In his opening speech, Lord de Grey pointed out the objects with which the Society had been established, and described the advantages which Architecture, as a national art, would derive from its foundation. His remarks were followed by an able address from the Senior Secretary, who was enabled to state that nearly 80 members had already been enrolled, that through the courtesy of the Foreign Office communication had been opened with several of the continental Academies, and that the nucleus of an excellent Library had already been formed. Mr. Donaldson expressed his hope—a hope which he has lived to see realized—that in due time prizes would be offered to young architects for original designs and measured drawings of ancient buildings. He referred to the opportunities which would arise for discussing at the periodical meetings of the Institute questions of scientific and antiquarian interest, and he adverted to the possibility of establishing a fund which would aid the student in foreign travel. In short, Mr Donaldson foreshadowed most of the projects which the Institute has since been enabled to carry out, and it is a tribute to his sagacity to observe that these early records, which I have perused with deep interest, include no visionary schemes which have since been abandoned, or ambitious prophecies which remain unfulfilled. Since those days the Institute has indeed extended the sphere of its work, and largely added to its aims; but in the path which its founders opened there has been at least, so far as I can trace, no retrogression. No castles in the air have vanished, because none were ever designed.

In regard to the subdivision of members, the general conditions of membership, the formalities of election, the regulations respecting ordinary general meetings, and many other matters, the Bye-laws drawn up in 1835 are almost identical with those of 1876. Even the amount of subscriptions, except in one particular, remains the same. The Council has indeed doubled its number of Ordinary Members, but its constitution in other respects is unaltered. The earliest programme of our Sessional Papers on record includes the same variety of subjects which we are accustomed to hear discussed at the present day. The recent discovery of the Crypt at York Minster, an Essay on Building Stones, a List of Queries for Architectural Investigation, a Biographical Memoir, the Description of a Tunnel Sewer, a Paper on "Ventilation and the Construction of Flues," another on "Suspension Bridges," and a "Review of Professional Practice,"—such were the themes which interested the last generation of architects, such are the themes which attract—or, shall I say, *ought* to attract us?—in our day.

At the first inaugural Meeting, a Medal was offered for an Essay "On the Nature and Properties of Concrete." This was gained by Mr. George Godwin, who dealt with the subject in a very able and exhaustive treatise. The Institute soon after published a useful little pamphlet, entitled "How to Observe," containing a series of suggestions for the purpose of aiding antiquaries and amateurs of architecture in their communications to this Society.

For the first year or two, as may be supposed, the funds of the Institute did not permit any regular and official publication of the Sessional Papers, though some exceptions occurred, and the Council always claimed the copyright of such Papers until a certain interval—twelve or eighteen months—had elapsed after the date of reading. Nor were there for some time any external facilities for giving publicity to these communications. When the Institute was first established I believe no strictly professional journal, in the present sense of the word, was in existence. The "Civil Engineer and Architects Journal," however, was started in 1837, and continued to be published until 1849. In this periodical may be found abstracts, and after a time full reports of Papers read at Ordinary General Meetings of the Institute.*

* The first number of the "Builder" appeared in 1842.
 „ of the "Building News" „ in 1855.
 „ of the "Architect" „ in 1869.

In 1836 the Council reported to the general body of members as to the expediency of procuring a Charter of Incorporation for the Institute. The expense was estimated at £300, and Mr. W. L. Donaldson, then Honorary Solicitor, undertook to prepare the draft. A resolution was passed at a General Meeting adopting this recommendation, and a subscription was at once opened towards defraying the cost of the Charter. By the following year the Charter, obtained through the influence of Earl de Grey, had been printed, with the bye-laws attached to it, and circulated among the members. This step at once gave stability to the Institute, and placed it on the same footing as other incorporated Societies. In the same year the Institute moved from its old quarters in Covent Garden to the more aristocratic neighbourhood of Grosvenor Street, where, at No. 16, it occupied rooms for many years afterwards. By this time Mr. Charles Fowler had succeeded Mr. Goldicutt in the position of joint Secretary with Mr. Donaldson, and the two names were long and honorably associated. In their report to the Annual Meeting in 1837 the Council naturally congratulated the general body of members on their improved position, one of the first fruits of which had been an exchange of Transactions with the Royal Societies of London and Edinburgh, the Royal Society of Literature, the Royal Geographical Society, and the Institution of Civil Engineers. The Society of Antiquaries and the Trustees of the British Museum contributed some valuable works to the Library. Meanwhile communications with Foreign Societies had been extended by the election of new Honorary and Corresponding Members of the highest reputation on the Continent.

In 1838 a proposition was made by the Architectural Society for the incorporation of that body with the Institute. Committees were appointed on either side, and after several meetings agreed upon a scheme of union which it was hoped would give mutual satisfaction. But, unfortunately, though it met with approval from the Institute, it was rejected by the Architectural Society. The result was that eighteen members of that body withdrew, and, of them, thirteen were at once elected members of the Institute. In reviewing this and other attempts to secure for the profession of Architecture that unanimity of practice and principle which would naturally result in the establishment of one representative Guild, and one only, it is almost superfluous to point out the obvious advantages of such a scheme, regarded theoretically, and the practical difficulties which, if we may judge from experience, invariably arise in the course of its realization. It is true that in the legal and medical professions, for instance, the absolute necessity of united corporations has long been recognized. But it must be remembered that the conditions under which those corporations have been formed are widely different from any which we can hope to see founded in the present era of architectural practice. The absence of a legally authorized professional diploma as a condition of membership will in itself account for the existence of a large body of outsiders who from conviction or temperament are indifferent to what we are accustomed to call *esprit de corps*, and while this independence of action is maintained by individuals, we cannot be surprised if it tends to the formation of distinct Societies. But apart from this cause, it must be remembered that artistic aspirations form, or are at least supposed to form, an important element in our professional status. Now it is notorious that art societies multiply more rapidly than any others, and for my own part I believe it is only because architecture is a business as well as an art that we have not a dozen Institutes at the present time:—so diverse are the aims, and so opposed are the principles which may be recognized in our profession from an æsthetic point of view.

One of the first important steps taken by our Society, at the time to which I am now referring, was the appointment of a Committee to consider the question of Public Competitions—a subject of peculiar interest then, as indeed it has frequently become since. The Committee issued their Report in 1839, and it obtained a wide circulation. In glancing at this official record of opinion on a theme which has now grown threadbare by discussion, one is struck by the similarity between the arguments, grievances, and remedial

suggestions enumerated by the last generation and those with which we are familiar in the present day. The advantages of the system are few but definite. It encourages emulation which, within limits, is of course a very desirable quality in any artist. It offers an opportunity for rising genius which might otherwise languish unencouraged. It opens a range of choice in respect of taste and technical skill which is of singular advantage to a public too often hopelessly ignorant of our art. On the other side, as we all know, the system presents a melancholy picture of professional jealousy, disappointed hopes, underhand jobbery, and sometimes, though let us trust less frequently now than formerly, instances of cruel and deliberate injustice.

In saying that there has been no departure from the scheme originally proposed by the Founders of this Institute, I ought perhaps to note one exception. The periodical delivery of lectures on scientific subjects connected with the study of architecture, *e.g.*, acoustics, geology, and the use of iron, formed part of the early programme, and for a time proved attractive, but at length the attendance of members fell off, and the Council did not feel justified in incurring the additional expense entailed, for the lecturers were paid for their services. Meanwhile the Institute prospered in more than one sense. The Library was continually enriched by donations from foreign members. Many of the nobility became Honorary Fellows (I only wish the list was longer at the present time), and the Queen graciously allowed her name to be announced as Patroness. It is a curious evidence of the urgent need which had been felt for the establishment of the Institute and the guarantee it affords for the integrity of professional practice, that the Council, in their Report for 1840, took occasion to disclaim, on behalf of all respectable architects, any share in that pernicious system which had once permitted their accepting a commission from tradesmen in addition to that received from their clients. The bye-law which prohibits, under pain of expulsion, any member from receiving such a gratuity was then, as it still is in existence, and afforded material for the first if not the best answer to that invidious question which has sometimes been asked—What is the use of the Institute? In 1841, the appointment of Lord De Grey to the office of Lord Lieutenant of Ireland deprived the Institute for awhile of the advantage of his personal attention, but by this time Mr. Donaldson, who had retired from the position of Honorary Secretary, though he still conducted (I need scarcely say how zealously) the Foreign Correspondence, was elected a Vice-President, together with Mr. Charles Barry and Mr. Philip Hardwick, both Royal Academicians, and both gentlemen who occupied the foremost rank in our profession. With such deputies as these it will be obvious that the President's absence was less felt, and indeed the *éclat* which in the eyes of the outside world attached to his social rank was probably more than compensated for within the walls of the Institute by the fact that the chair was now filled in turn by three architects of undoubted popularity and attainments. The Institute possessed an additional advantage in the services of Messrs. Charles Fowler and George Bailey as Honorary Secretaries.

Among the Papers read at this period was one which deserves especial mention. I mean the valuable essay on "Vaulting in the Middle Ages," contributed by Professor Willis, and at the time of its publication one of the most learned and exhaustive treatises which had appeared on the subject. The Council paid it a tribute of respect which no other of our papers has received before or since. An extraordinary number of copies were printed, and the sum of £400 was devoted to meet the expense of the volume for that Session. It is needless to add that that was not paid out of income, and considering the state of the Institute finances, it may be regarded as a somewhat bold investment. About this time a proposal was made to secure more convenient quarters for the Institute than those in Grosvenor Street, but it came to nothing, and several years elapsed before premises were secured elsewhere.

In the year 1843 the question of Competitions was again brought before the Institute on the

motion of Professor Hosking, who seems to have condemned the whole system except in cases where every competitor was paid for his work. The subject was discussed at a General Meeting, but with no practical result beyond the ventilation of opinions which I suppose are pretty much the same as have always been formed on the matter. That there have been, and unfortunately still are, conditions attached to public competitions which are disgraceful to those who offer them and still more disgraceful, from a professional point of view, to those by whom they are accepted, is an abstract proposition which no one in this room would be likely to deny. But unfortunately the only remedy lies in a measure that would probably be a worse evil than the one we wish to remove. It would, of course, be possible to shape the conditions of membership of this Institute in such a form that no one connected with it could take part in objectionable competitions. But it may be doubted whether it is not preferable that such competitions should exist than that a body of professional men should adopt rules based on principles analogous to those of a Trades' Union.

In 1844, the Trustees of the British Museum, who had appointed Mr. Hawkins to accompany Mr. (afterwards Sir Charles) Fellows on an expedition to Asia Minor, applied to the Council of the Institute for suggestions, which might guide that gentleman in his Antiquarian researches. A paper of instructions was accordingly drawn up indicating the points most worthy of the traveller's attention during their tour. It is only a few years since the same advice was sought and rendered in reference to the Palestine Exploration Scheme, and it is gratifying to note these early and recent instances in which the Institute has helped to promote a national object.

The aspect of modern London up to this time, had been one little worthy of this rich and ancient Capital. But a marked attempt was at length made to improve its Street Architecture, and the Club Houses which rose one after another in Pall Mall represented, in spite of certain defects, an effort in the right direction. That the standard of Metropolitan splendour was not over ambitious, may be gathered from the fact that in 1845, the Council while congratulating the Institute on the completion of Trafalgar Square, "with its terraces, flight of steps, fountains, basins and triumphal column," expressed their opinion that "a feeling had arisen in the public for rich and effective combinations of objects of a monumental character." The Thames Embankment was a scheme still *in nubibus*, but the subject had been brought under the notice of a Parliamentary Commission in connection with other plans for Metropolitan Improvement.

In 1846, at the instance of Lord de Grey, Her Majesty was graciously pleased to bestow on this Institute a lasting mark of her favour, by founding the Royal Gold Medal, the annual award of which has since become one of the most interesting events of our official year. It was originally intended as a Student's Prize, to be offered for the best designs in Grecian, Roman or Italian Architecture, and the Council proposed to supplement it with the sum of £50. on certain conditions of Continental study—such as are at present attached to the Soane Medallion. But the Fates had ordained another destination for the Royal Medal. Although the subject fixed on for the prize was one calculated to fire the enthusiasm of competitors—being no less than a design for a New Institute, the drawings submitted did not reach that standard of merit which the Council deemed necessary to justify the award, and no award was made. But out of this apparent evil a decided advantage resulted. A consultation took place, and with Her Majesty's consent that which had been founded as a Student's prize, became the most honourable distinction to which our profession can aspire—a distinction which is coveted by Foreigners as well as by Englishmen, and which has been conferred—I need not tell you how deservedly, on the eminent and gifted French architect whom we have the pleasure of welcoming this evening. About this time I am glad to find that the Institute took the first steps towards the organization of a benevolent scheme, which, though it has since passed into other management, was first devised by a

Committee of our own body, and is still supported by a large number, I wish I could say by *all*, of our own members. That excellent Institution, the Architects' Benevolent Society, the very name of which proclaims its object, and should suffice to enlist our sympathies, is an offspring of which the parent Institute may well be proud. Ably managed and judiciously administered, this charity has for many years past done much good and silent work, and if to mention it be a digression from the immediate subject of my Paper, I hope I shall be excused by making it an appeal for your extended, continuous and liberal support.

While referring to the prolific character of the Institute, I must not forget another bantling which may claim its paternity, and has received its fostering care.* I mean the Architectural Publication Society, which after experiencing many vicissitudes is now in a fair way to arriving at maturity. "Of making many books," says the Preacher, "there is no end." In this case there is only one book, but a big one, in many volumes, and I make no doubt, that when Mr. Wyatt Papworth writes "*Laus Deo*" on the last sheet of copy for the Dictionary of Architecture, he will have completed a work for which posterity as well as his contemporaries will be grateful.

The year 1849 was remarkable for the appointment of a Committee whose object was precisely similar to the one which reported only last year, viz.:—An Enquiry into the affairs of the Institute, with the view of increasing its efficiency. That History repeats itself is a proverbial fact, and it is curious to note that some of the problems which presented themselves for solution a quarter of a century ago, have turned up, like a recurring decimal, in the present day. Many of the schemes for improvement then devised have since been realised, as for instance, the publication of a synopsis of our proceedings at the close of each Session, the appointment of Special Committees, the holding of an Annual Conversazione, the requisition of Original Papers from newly elected Members, the adjudication of Prizes by the General Body of Members, and modification of the terms on which Associates were elected. But wilder proposals for reform met with no encouragement and were consigned to that limbo which is guarded by prudence and discretion.

The following year found the Institute, like the rest of the world, big with hope as to the result of the first Great Exhibition of all Nations. With great public spirit the Members voted a sum of fifty guineas towards an undertaking, the effect of which though vastly overrated in regard to some of its aims, has I suppose, had a permanently beneficial influence on the industrial art of this country.

By this time Mr. J. J. Scoles had succeeded Mr. Poynter as Honorary Secretary, and in conjunction with Mr. C. C. Nelson held that office, while Professor Donaldson still conducted the Foreign Correspondence. I cannot mention their names or those of Mr. (now Sir Digby) Wyatt, and Mr. T. Hayter Lewis, who shortly afterwards occupied the same position, without reminding my hearers how deeply indebted the Institute is to the zeal and energy with which those gentlemen discharged their duties. They held office during a period which must have been a most critical one for the welfare and advancement of this Society, and it is not too much to say, that but for their exertions it might never have been what it has since become.

It was at the Foreign Secretary's suggestion, that in 1851 the Council with the authority of the general body of members, memorialised Her Majesty on the subject of the Royal Tombs in Westminster Abbey, which at that time bade fair to perish from decay and mutilation. In the previous year a Committee of Members had done public service by their advice respecting the Metropolitan Buildings' Bill, then in course of preparation. A little later, we find in the Annual Report, an earnest appeal for the necessity

* Mr. Wyatt Papworth has since corrected me on this point. The Institute encouraged the efforts of the Architectural Publication Society, but was not concerned in its formation.

of improving the dwellings of the poor, and special mention of Mr. George Godwin's name, which has been so often and honourably associated with that benevolent object. In these and numerous other instances, the Institute has identified itself with matters of national importance, and I trust will long continue to do so.

For some years following the period at which we have now arrived in the History of the Institute, no material changes in its administration took place; nor do we find any events of importance recorded in its annals. The number of members increased gradually, but not at the same rate as in the first *decennium* of its existence, and by no means so rapidly as at the present time. A considerable proportion of the Annual Reports issued by the Council was devoted to comments on the Papers read during the previous Session. Events of public or professional interest, such as the completion of the Houses of Parliament, the establishment of the Architectural Museum, the International Competitions at Amiens, Hamburgh, and Lille, the Public Health Bill, and various architectural improvements in London, elicited from time to time an expression of official opinion; but as they are matters lying beyond the immediate scope of this Paper, I will not stop to consider them in detail.

The Metropolitan Buildings Act, passed in 1855, marked a notable event in the career of the Institute, by including in its provisions that Examination with the conduct of which the Institute has been since officially charged, and which every candidate who desires to become a District Surveyor is expected to pass before he can be appointed to that office. This practical recognition by the Government of our Corporate Body is one which could scarcely be gratifying to all who value its national status; and it is due to the memory of Sir William Tite to add that he availed himself of his position in Parliament to accomplish that which he was eminently qualified to recommend. It was at first thought that this measure would have formed a basis for the adoption of one in which our Profession is more immediately interested, viz.—the establishment of a Diploma—but the question, as you know, remains unsettled at the present time, in spite of endless discussion and arguments, which have almost become stale by repetition. The subject is so intimately allied with another to which I must presently refer—viz., the Architectural Examination—that I shall reserve the few words that I have to say respecting it until I can deal with both together.

The limited extent of my Paper prevents me from describing at any length the origin and progress of the Architectural Association,—a Society of young and energetic students formed in 1842, and which as you know, still flourishes under this roof. Suffice it to say, that in 1857 certain proposals were made by which it was supposed the Association might be induced to join the Institute, and in fact become merged in it, on apparently advantageous terms. The offer was then, as it has been since, courteously declined; and though one cannot help regretting that in a profession like ours, one representative Society does not suffice to secure all the requirements of a professional guild—(and this, in the interests of Architecture, whether regarded as an art or a business it should undoubtedly do)—one can nevertheless understand and appreciate that independent spirit of the Association which has resulted in honest emulation and judicious self-government.

The time had now arrived when the increasing number of its members, and the enlarged scope of its corporate functions, obliged the Institute to think of securing more room and convenient quarters than those in Grosvenor Street. This desideratum led to the formation of the Architectural Union Company, a body of professional men who raised, by the issue of shares, a capital sum, sufficient to secure these premises for the occupation of Societies connected with architecture, and with architecture alone. Such at least was the hope entertained at the time; and if I am wrong, I can but refer to the legend which is inscribed on the front of this house. The principal floor was destined for the special use of the Institute, while the spacious galleries which were erected at the rear of the building were intended to

accommodate the Architectural Exhibition, the Architectural Photographic Society, and the Institute itself, on certain occasions. But alas for the vanity of human aspirations! The Architectural Exhibition, after struggling many years for existence, is defunct; and the Photographic Society did not long survive it. The Genius of Painting and the Goddess of Music, both arrayed in a somewhat commercial garb, have by degrees taken possession of the ground floor, while the sister art of Architecture lives in daily fear that, as time goes on, they will be creeping upstairs. To drop the metaphorical strain, let me remind you of the specific purpose for which these premises were acquired, and express my earnest hope that we may ere long make some effort so to secure them for our Society, that it may be housed in a manner worthy of its name.

In 1859, Mr. F. C. Penrose, whose researches in the field of Greek art had secured for him a well-deserved reputation, succeeded Professor Donaldson as Hon. Secretary for Foreign Correspondence; while Mr. Digby Wyatt, who had held office as Hon. Secretary for three years, gave up his portfolio to Mr. Thomas Hayter Lewis, better known of late years as the distinguished Professor of Architecture at University College.

In 1860, the Institute found itself in new quarters and under new generalship. Lord de Grey, whose last public act was to open the proceedings of the Session, died full of years and honours, after having held the office of President for a quarter of a century. On the abstract question whether it is or is not desirable that that office should be held by a non-professional Member, opinions may be divided, but there can be little doubt that, while the Institute was still young, and required the stimulus of Royal favour and aristocratic patronage, Lord de Grey's social position was of immense service in securing those advantages. With his name our Charter will be inseparably associated. To another non-professional President—Mr. Beresford Hope—the Institute is indebted for having been enrolled among the Royal Societies of this country.

Lord de Grey was succeeded by one whose name is among the most loved and honoured in our profession,—an architect who at an early age received from the world, as a tribute to his talents and accomplishments, an amount of admiration which might have turned the heads of vainer men, but which wrought no change in his naturally modest and unassuming disposition. Gifted by nature in more than one sense,—a cultivated scholar, a refined artist, a courteous and kindly hearted gentleman,—I can scarcely fancy in our profession a career more worthy of respect and imitation than that of Charles Robert Cockerell.

The removal of the Institute to its present quarters was followed by a large accession of Members, and seems to have stimulated the Council of that day to the consideration of novel measures. The subject of a professional Examination had long been discussed in connection with the diploma question, and in 1861 it was brought before a Special General Meeting, at which considerable difference of opinion was expressed. Eventually the matter was referred to a Committee, who in due course presented their Report. Of this Committee the late Mr. Arthur Ashpitel was Chairman, and the late Mr. J.W. Papworth Hon. Secretary; and if the Architectural Examination scheme may be considered one of the good works of this Institute, to Mr. Ashpitel and Mr. Papworth must be accorded the chief praise for having accomplished its organization.

In dealing with this important question two preliminary questions had to be settled. The first was whether the Examination should be voluntary, and the second was whether passed candidates should be entitled to a diploma. The former was one which soon settled itself. In the absence of any legal obligation to qualify, a compulsory examination even for Members of this Institute would have been out of the question, and the logical deduction was that a diploma, which conferred on those who possessed it no more right to practice than those who did not, was of no value. For a long time even the

issue of a certificate was steadily opposed, and of late years, since that point was ceded, the mortifying discovery has been made that we have won a hollow victory. The principle on which a certificate should be granted is admitted on all sides, but meanwhile the Examination languishes, not for want of certificates, but for want of candidates to claim them. The truth is that a certificate is not the same thing as a diploma, and the issue of a diploma involves a question on which a great difference of opinion has always prevailed. It is, in short, the question whether architecture should be an open profession or not. The arguments on both sides may be briefly summarized as follows:—The supporters of a diploma said, in effect: “We are members of a profession which is no less a business than an art. To the duly qualified practitioner it involves an expensive education, a long course of study, including researches in physical science, chemistry, geology, and what not, an acquaintance with mathematics and the theory of construction, an experience of legal issues, a commercial insight into the value of materials and labour, to say nothing of such accomplishments as an linguist and a draughtsman may claim. Is it right or is it fair that after we have spent the best part of our lives in attaining these qualifications we should find ourselves, in the eyes of the public, in no better position than a builder’s clerk, who, being a pushing young man, with a little interest and more assurance than his betters, touts for every job that he can secure, and with no real pretensions to taste or advantages of education, slips into a practice which many a qualified man can never secure? The remedy for this is an Examination and a diploma, without which no one should be allowed to call himself an architect. Establish them, and the public as well as the profession will be benefited.”

On the other hand their opponents replied: “It is quite true that architecture is a business as well an art, but it is an art first, and into the exercise of that art the element of natural taste, however cultivated, largely enters. How can the value of that taste be gauged by a standard which must always be fleeting and therefore empirical? Who can say, even of our accepted authorities, that they are unanimous respecting the choice of a style or even the varieties of a style? For three examiners who pronounce in favour of a design you may find nine outsiders of equal eminence who call it commonplace. And if a criterion is to be sought among those monuments of antiquity whom all agree in admiring, a new argument must be encountered. The great masters of our art, who flourished in Italy and France, to say nothing of those in this country, graduated in no school of architecture, and who will contend that their works are the worse for it? It is true that you may eliminate the question of taste altogether and confine your Examination to matters of practical science, but whom will this benefit? Not the *bonâ fide* architectural student who has naturally turned first to the artistic studies of his profession, and who has yet to learn its science and its business from experience, but the builder’s foreman or clerk of works, who has worked at the bench and knows twice as much about construction as any young gentleman who has just completed his articles. Your Examination in short will become the means of admitting to the ranks of our profession the very men whom you wish to exclude.”

Such, gentlemen, were some of the old pro’s and con’s of a question on which I will venture to offer no personal opinion and from which I must now pass to other topics.

The Professional Practice Committee, one of the first and most useful of those appointed by the Institute, had long felt the desirability of establishing a series of rules relating to the practice and remuneration of architects, which, based on custom and confirmed by experience, might serve as an authority for the profession as well as a guide to the public. It was a measure which required some caution and delicacy in promoting, and one on which it was deemed advisable to consult the opinion of individual members. With this object in view a series of questions was drafted and confidentially circulated among members of the Institute. The result was a mass of valuable information, which after careful sifting and analysis, afforded material for the General Rules drawn up in 1862, and, after

a slight modification is still recognised not only by members of the Institute but by the profession at large. It is to be observed that those rules, although not absolutely binding on any one, represent so fairly the details of professional usage, that they are constantly accepted as evidence on that subject in Courts of Law.

The year 1862 saw another good work accomplished by the Institute. An excellent and thoughtful Paper had been read by our late President, then Mr. G. G. Scott, "On the Conservation of Ancient Monuments and Remains," calling attention to the neglected state of many architectural relics in this country, and urging the necessity of adopting some means of rescuing them from decay and wanton injury. Such a duty would, in the minds of optimists, naturally devolve upon the State. But the principle of British Government, as we know, is not paternal, and the fear of interfering with the rights of private property has long presented difficulties in dealing with this question. Under these circumstances it seemed advisable that a standing Committee should be appointed by this Institute for the purpose of investigating cases in which a protest might occasionally be made in favour of ancient buildings threatened with destruction. One of the first duties undertaken by this Committee was the preparation of a series of suggestions for the guidance of architects and others charged with the custody or restoration of such buildings. The issue of that Paper was in itself of service. But the Committee has done more than this, and ever since its appointment it has lent a ready ear to every appeal which has reached it on behalf of architectural relics of historic or artistic interest. In some cases, of course, when counter-pleas of public utility can be urged or financial considerations present themselves, a remonstrance from any quarter must be unavailing, but speaking generally, whenever the Institute has been justified in interfering it has done so, and I believe not unfrequently with success.

In the late Sir William Tite, who succeeded Professor Cockerell as President, the Institute found a liberal benefactor. His wealth enabled him to contribute largely to many of the objects for which this Society was founded, while his position in Parliament gave a certain weight and influence to any measures partaking of a public character which it undertook during his twice renewed term of office. Among the numerous acts of generosity that are associated with his name may be mentioned a gift of £500 to the Library Fund, and a legacy of £1,000, the interest of which under the terms of his will is annually devoted to encourage the study of Italian architecture. I cannot refer to the former gift without reminding you of the splendid store of literary and illustrated works on architecture which has been gradually amassed in our library—a collection—so far as I know, quite unrivalled in this country, and presenting great advantages to the student. To Mr. Wyatt Papworth the Institute is largely indebted for gratuitous services in forming that collection, which, for some years past, has been under the care and efficient supervision of our Librarian, Mr. S. W. Kershaw.

It was during Mr. Tite's first term of office that the Institute appointed a Committee, of which Mr. Charles Barry (our present President) was Secretary, for the purpose of drawing up and forwarding to the First Commissioner of Works a series of valuable suggestions respecting the Thames Embankment. A few years later the Institute took an active part in advising the Government on the subject of a new Metropolitan Building Act. I might mention many other instances in which this Society, seldom accredited with anything beyond the advancement of professional interests, has undertaken, at a considerable sacrifice of time and trouble, labours for which the public has reason to be grateful.

In 1860 Mr. C. C. Nelson, having discharged the duties of Honorary Secretary for twelve consecutive years, retired from office, after receiving a handsome Testimonial in recognition of his zealous and active services. In the same year the Institute paid a fitting tribute to the memory of Sir Charles Barry by attending his funeral in Westminster Abbey. His friend and fellow-worker, Welby Pugin, had predeceased him by some ten years; but the cause which Pugin had most at heart—the Revival of Gothic Architecture—was still a watchword with his friends and admirers, who determined to per-

petuate his name by founding a Studentship, with the nature of which you are all familiar. The power of awarding that Studentship is vested in the Institute; and I am glad to add, that the result has been most gratifying to all concerned.

In 1862 Professor Donaldson succeeded to the highest office in the Institute, and it was during his Presidency that Mr. C. F. Hayward and Mr. J. P. Seddon were elected Honorary Secretaries—a position with which their names will be long and gratefully remembered. In the following year, the first Architectural Examination was held, and eight Candidates passed in the Proficiency Class. Of these, two subsequently passed in the Class of Distinction. Modest as these numbers are, they have never been reached since, in spite of certificates and other inducements; and this want of response is a question which still remains to be solved. In 1863 the Council appointed a Finance Committee, who have since discharged the responsible duty of regulating the expenses of the Institute, and who annually issue an Estimate of the Receipts and Disbursements for the year. A little later an attempt was made to establish, in connection with the Institute, a School of Art accessorial to Architecture. This scheme, after some delay, was in part realized by the Art Classes for figure drawing, &c., opened at the Architectural Museum, and in support of which some liberal grants were made by this Institute. But here, again, the demand for this species of Art-education was found incommensurate with the supply. The British workman and the young British student of Architecture were found on trial to be somewhat indifferent to the opportunities provided for them, and the plan was abandoned.

In 1865 Mr. Beresford Hope, one of the most accomplished of our Honorary Fellows, was elected President of the Institute, and entered upon the duties of his office with a zeal hardly expected from an amateur, but eminently characteristic of his devotion to our Art,—a devotion which may be described as one of the traditions of his family.

On Mr. Hope's retirement from office in 1867, Mr. Tite was re-elected, this time for three years. To him succeeded in due course and for a similar term of office, Mr. Thomas H. Wyatt and Sir Gilbert Scott. It would be almost presumptuous, and certainly unnecessary for me to dwell upon the advantages which this Institute has derived from the generalship of two such distinguished Presidents. During Mr. Wyatt's Presidency, the rules of the Architectural Examination were revised with considerable advantage both to the Candidates and Examiners. The Conditions of Builders' Contract, prepared by the London Builders' Society, after consultation with our Professional Practice Committee, were published in a concise and useful form, with the sanction of this Institute. A series of regulations intended to guide the promoters of professional competitions was drawn up and extensively circulated, and Parliament was memorialised on more than one occasion in the interest of our art and its practice. During Sir Gilbert Scott's term of office, the Institute prepared a report on the subject of the late Metropolitan Buildings and Management Bill, and, with the active co-operation of the District Surveyors' Association, succeeded in opposing it before a Select Committee of the House of Commons.

The duty of arranging an annual programme of Sessional Papers was definitely entrusted to a committee, to whom the Institute has since been indebted for many interesting and valuable communications. A scheme has also been set on foot by the Committee for the Conservation of Ancient Monuments, for collecting and depositing at the Institute measured drawings illustrative of old English architecture. In short, during the last six years, the Institute has largely extended its functions and sphere of work. A perusal of the Notice Papers and the Annual Reports which have been issued within that period will reveal a record of almost uninterrupted activity, and will afford the best answer to that ill-natured and groundless assertion which we find occasionally made that the Institute is doing nothing, simply because it has not been noisy and officious. It would be a mere platitude to observe that the best and most useful work which is done in this world is often quiet silent work, and I think we should all regret if this Institute, for the sake of a little public notoriety, were to rival in this Meeting

Room the cheap and fussy eloquence of a Vestry Hall. But if we are to be judged by deeds rather than words, I could give numberless instances in which the Institute has done good and public service to our profession and the art which it represents. The very proceedings we inaugurate this evening—the Conference itself, grew out of a scheme proposed, not very long ago, by the Architectural Alliance, and matured by a Committee of the Institute, in which Professor Kerr took an active part; and at the present moment there are under consideration by our Council and past Vice-Presidents questions involving as important issues as any which have called for your decision.

In 1867, the number of the Council was increased by five, an addition contemplated in our Charter, and fully justified by the fact that the Institute has sextupled its numbers since that Charter was granted. The term of office for which the President and Council are nominated has been prolonged to three years, subject, however, to their annual re-election by the General Body. The policy of this change will be understood when it is remembered how largely the functions of the Executive have increased of late. It is not too much to say that it requires months of experience before a Member of Council can really master the details of the work which he has undertaken, and it would be obviously inexpedient that he should retire from office at the very time when his services are becoming most valuable. Few of those who have not served in the Council can have any idea of the number and variety of subjects brought under their notice and requiring their consideration.

About thirty Council Meetings are held during the Session, and on each occasion, perhaps, a dozen matters of more or less importance are discussed. Some of these are at once referred to Committees, of whom no less than fourteen sat last year; the total number of their Meetings having been fifty. The Committees report to the Council, in whose name all external business is transacted. This business, it must be remembered, is often quite independent of that involved by the General Meetings in this room, of which some twenty have been held during the past twelvemonths. With these statistics before you, you will not perhaps be surprised to hear that the official correspondence in 1875 reached 1600 autograph letters. As for communications in a set form, half lithographed and filled up by hand, printed circulars and notices,—they are issued by thousands. The letters we receive may be generally classed under two heads, those which come before the Council and those which do not. The first are permanently deposited here; the others are classified under some twenty different heads, and preserved for a year or more according to their importance. This subdivision may be considered excessive, but it enables the Secretary at a short notice to refer to any letter on any subject under discussion. The Minutes of Meetings are all indexed on the same principle and for the same object.

The publication of our Transactions, formerly deferred until the close of the Session, now takes place, whenever possible, once a fortnight. This would present no difficulty so far as the Papers themselves are concerned, but in order to ensure accurate reports of the Discussion a copy of each speaker's remarks is now sent to him for correction, and they are not always returned in time for issue between one General Meeting and the next. Even with this precaution the most careful editing is required to prevent mistakes, and whenever such mistakes occur it is generally because the publication has been hurried. At the recommendation of the Sessional Papers Committee special invitations are sent before each General Meeting to members and others likely to be interested in the topic under discussion. I have issued as many as fifty of these invitations for a single Paper.

Without wearying you with further details, or referring to those special matters of business which require special attention, I shall perhaps have said enough to shew you that duties which include those of a Secretary, Editor, and Accountant, could not possibly be expected from an honorary officer, who, to be of practical service, must attend daily at the Institute, and that for not one, but for six or seven hours a day,—at least at this period of the Institute's career. It was with this conviction that, five years ago, the General Body resolved that one of the Secretaries should receive a salary, and having said thus much, I shall say no more on a subject respecting which I should be the last to obtrude my personal opinion.

For similar reasons I shall refrain from comment on any of the measures which the late Committee on the Affairs of the Institute and the present Committee of Council and past Vice-Presidents have had under consideration. It is obvious that, as time goes on, and the conditions of things change, the administration of this and every other Society will present opportunities for improvement which commend themselves with special importance to individual minds. It is on such occasions that the collective wisdom of an Executive Body is of service. They alone can estimate the worth of this or that suggestion for reform. They alone know the difficulties which have deferred its realization.

Finally, in thanking you for the kind attention to which you have listened to a Paper, prolonged I fear, too far for your patience, I will only add my hope that the General Conference which this Meeting inaugurates may be attended by practical advantage to our profession and to the several Societies by which it is represented.

Mr. T. H. WYATT (Past President).—May I be permitted to add one word to the Paper? Mr. Eastlake has omitted to mention one proof of the influence of the Institute. During the time that the approach to the embankment by way of Northumberland Avenue, was under the consideration of Parliament, I, being then President, was asked whether it was probable the Institute would undertake to exercise control over the elevations and designs of the buildings to be erected on each site of that approach. I had no hesitation in saying I thought it would. That is a proof of the influence which this Institute has exercised upon the mind of Parliament.

The PRESIDENT.—Before inviting remarks upon the Paper, it is my painful duty to make a communication in reference to one of the subjects referred to in it. Mr. Eastlake has told us that there are three survivors amongst the ancient founders of the Institute. I am sorry to say one of them passed away on Saturday last. After a long life of usefulness, closed by lengthened suffering, Mr. Bellamy died on Saturday. I am pleased to say that one of them is still amongst us—our honoured friend Professor Donaldson—as active and almost as young as ever. He will favour us with some remarks, I am sure, for the Paper of Mr. Eastlake must have called up old memories to a large extent. The fact that very few of the original designs and aims of the founders of this Society were found to be chimerical must have been due to the good sense of Professor Donaldson and his colleagues, and of that good sense we have had numerous more recent proofs. There is only one other remark I would make. Mr. Eastlake alluded to the possibility that in consequence of the divergence of taste in art, some division in the Institute might be expected to exist. Now that is so against the whole feeling on which I have ventured to address our colleagues to-night, that I am bound to say I cannot agree with him. I repeat what I remarked to Mons. Duc, that I believe a real bond of brotherhood in art exists, though the particular form in which our art is exercised may be very divergent.

Professor DONALDSON (Past President) said: I have nothing to add, Mr. President; because Mr. Eastlake, with great intelligence, has brought together the prominent features which have distinguished the progress of our Institute. He has treated them most fairly, and I think he has used a wise discretion in the manner in which he has done it. I have great pleasure in proposing that the thanks of the Meeting are due to our Secretary for the way in which he has sketched the history of the Institute.

Mr. THOMAS HENRY WYATT seconded the motion.

The PRESIDENT.—Professor Donaldson has fairly silenced us. He tells us Mr. Eastlake has told us all that could be said, and that he can add nothing on the matter. It is, therefore, my pleasing duty to put the proposition that the thanks of the Meeting be accorded to Mr. Eastlake for his Paper.

The vote of thanks was then passed; after which the President declared the Session to be closed, and the General Conference of Architects opened.

Royal Institute of British Architects.

SUPPLEMENT TO MR. FERGUSSON'S PAPER

(Read at the Ordinary General Meeting 14th February 1876)

ON THE ERECTHEUM AT ATHENS.

COMMUNICATION FROM DR. FORCHAMMER OF KIEL.

MR. FERGUSSON, D.C.L., F.R.S., F.R.I.B.A., has lately published a very interesting Paper on the most interesting building of Athens,—the Erechtheum, a copy of which the author has been kind enough to send to me. Mr. Fergusson considers the edifice chiefly from an architectural point of view. The less he regards the religious character of it, the bolder he appears in arranging the single parts of the building. He reads the riddle, but by putting outside what should be inside he creates another enigma. I do not intend to criticise the ingenious construction of the Temple propounded by the successful author of the brilliant restoration of the Mausoleum at Halicarnassus. I prefer to give my own explanation in concordance with what I lately have published in a book entitled “*Daduchos, Einleitung in das Verständniss der Hellenischen Mythen, Mythensprache und mythischen Bauten. Kiel, 1875.*”

Before entering into the question and explaining the building and its parts, we must recall to the memory of the reader the following thesis:—

- a. The whole building was a religious one.
- b. With it were connected a number of religious fables, belonging to the earliest times of Athens.
- c. In these there are at least some very clear indications of the primitive *physical* character of the Athenian and Greek religion: an *olive tree* was growing within the temple, the testimony of Athené's benefit to the land. That tree could not exist without water and air. Then there was *water* or a *lake*, created by Poseidon, and bearing the name of Erechtheus, who at the same time was called Poseidon and worshipped as Poseidon-Erechtheus. Further, there was a sanctuary of Pandrosos, the goddess of *dew*. In that sanctuary grew the olive tree.
- d. Besides the temple of Athene Polias and Pandrosos, there was a sanctuary of Erechtheus, a subterraneous chamber of Erechtheus, and a subterraneous chamber of Cecrops, the father of Pandrosos and her sisters Aglauros and Herse. Further, there was a portico of the “*Korae*” or Karyatides. The body of Cecrops was said to end (instead of in legs) in a serpent; and also Erechtheus was in his lower part a serpent. Pausanias 1,24,7, says, the serpent near to the spear of Athene in the Parthenon is Erichthonios or Erechtheus.

Now, I think in any restoration of the building, all these peculiarities must be accounted for. It certainly is not sufficient to place the rooms mentioned, architectonically, which can be done in many different ways, as is shewn by numerous restorations, and now by Mr. Fergusson, placing the Cecropion, the Pandroseion and the olive tree outside the temple.

It will be desirable first to look at the fables, and to try to understand their meaning. Cecrops

was married to *Agraulos* and father of *Pandrosos*, *Aglauros* and *Herse*. It is quite clear, that the father of the three genii of *dew*, as their name indicates, must be a genius of *humidity* in some form or other; the more so, as he was married to the genius of the *Attik land Agraulos*. It appears therefore very probable, that *Cecrops* originally was a genius of *rain*. Thus we understand, that after death he was elevated to the sky, where he became *Aquarius* of the *Zodiac*, whilst on earth he was supposed with regard to the inferior part of his body, to be like a serpent (τὰ πρὸς πῶδων δρακοντίδης *Aristophanes Wasps*. v. 438), which means, that the rain finishes in *serpentine rivers and rivulets* (on the symbolic meaning of *δράκων* and *ὄφεις*. See my book, "Daduchos" pp. 35—42.)

That *Cecrops* really was a genius of rain, I had already proved 1837, in my book, entitled "Hellenina," page 67. I had therefore ventured to prophecy, that by excavations there would be found a *cistern*, being the "Hypogeon of *Cecrops*," under the place in the *Pandroseion* next to the portico of the *Caryatides*, as assigned to it by the inscription. (Boeckh Corp. Inscr. 160.) Well,—that *cistern* with a beautiful double-roofed vault was found two years later, 1839, and may be seen in Mr. Tetas's drawing, attached to Mr. Fergusson's lecture, Fig. I. and IV. It was merely a proof of *amour propre*, that Professor Thiersch, M. Raoul Rochette, and the Athenian Commission declared the *cistern* to be modern, though it is cut in the rock, 1·30 metr. deep; and though some parts of the marble-wall of the temple rest on the wall of the *cistern*. We can now easily understand, why *Cecrops* enigmatically was called *δεφύης*, born of heaven; or if you like double-natured, or *αἰγυπτιος*=*αἰγ-ὑπτιος*, the hero of the returning waves. *Hesych. αἶγες κύματα*.

This settled, we have to inquire about the wonders in the history of *Erechtheus*, which is related in the same enigmatical way. The cloud-collecting god of heavens had devoured the vapour-rising daughter of the ocean. In order to get delivered of his pains and dulness he called the god, who makes lightning and thunder, to help him. *Hephaistos* cleft the clouds and *Pallas* with thunder and storm rose from the head of *Zeus*. In consequence of hail and rain, symbolically called the sperm of *Hephaistos*, falling on the earth, the goddess *Gea* procreated *Erechtheus*, the hero of the source or pond *Erechtheis* in the *Erechtheum*. We shall see afterwards how the pond *Erechtheis* served to moisten the soil wherein the olive tree was growing.

As for *Poseidon*, we know that he was not only a god of the sea, but that, being particularly worshipped in *Arcadia* and in other places, which had no connection with the sea, he is in general the god of moistening the earth, and therefore was called *Poseidon*, *Ποσειδάων*, *Ποτειδάων*, from *πόσις* *πόσις* and *δα=γῆ*. Now if the *Erechthean* pond was destined to moisten the soil of the olive tree (as will be proved by the existing ruins) it appears to be very natural that the god and the hero were worshipped under the common name of *Erechtheus-Poseidon*. After the rain falling on the temple and its *Temenos*, and after the increase of the water in the pond, it discharged necessarily into a rivulet, which was the reason why the Athenians said that *Erechtheus* finished in a serpent, and that *Pausanias* declares the serpent near the spear of *Athené* to signify *Erechtheus*. All these heroes and gods on the *Acropolis* were at the same time representatives of the nature of *Attica* throughout: *Erechtheus* of the rivers, *Kekrops* of the rain, *Pandrosos* of the dew, and *Poseidon* of the general watering power; and all these divinities were the promoters of the growth and fertility of the olive tree, the proof and witness of *Attica* belonging to *Athene* the goddess of the air, which receives and adopts every child—every produce of the earth. I am quite aware, that the whole of my exposition of these Athenian fables must be proved by the construction of the building, which I know by autopsy, and which I now am going to describe in a more detailed way than hitherto has been done, admitting some peculiarities recently discovered as antique, following a route of *Pausanias* differing from my predecessors, and not altering the evident meaning of the inscriptions.

Pausanias, after having turned from the southern enclosure wall of the Acropolis to the north, commences his narrative of the *Erechtheum*, viz.:—The great stoa (οἶκμα Ἐρέχθειον) at the *west end* of the temple. He first mentions before the entrance to the οἶκμα, the altar of Zeus hypatos, which was erected by Cecrops, whose hypogaeon was under the sanctuary inside of the wall with windows. Pausanias does not speak of the doorway under the second pillar of that wall, which evidently leads into the Cecropion. Leaving the altar of Zeus hypatos, Pausanias enters the *Erechtheum*, apparently *by the little doorway in its southern wall*. This was probably the common and perhaps the only entrance to it. The intercolumniations between the six columns probably were enclosed by metal grating; and the great doorway in the wall between the *Erechtheum* and the main temple was filled in with large regular blocks of blue marble, *which I have seen myself*. These were afterwards taken away, probably by some unhappy superintendent who naturally could not imagine that a doorway with so fine a cornice and frames should be closed up, being the for ever closed door (θύρωμα) to the hypogaeon of *Erechtheus*. On the stoa-side that filling of the closed doorway was covered by a double door of four large slabs (panels) of black marble inserted in to the (white?) frames (ξυγά). I think the slabs were of black marble, because they represented the door to the tomb of *Erechtheus*. The inscription, § 12, denotes this: IIII. θύραι λιθιναι μῆκος ὀκτὼ ποδῶν καὶ παλαστήης, πλάτος πέντε ἡμιποδίων. πούτων τὰ μὲν ἄλλα ἐξεποίητο, ἐε τὰ ξυγὰ δὲ ἔδει τοὺς λίθους μέλανας ἐνθεῖναι.

Pausanias does not say a word on his further passage to the temple of *Athene Polias*. No doubt he returned through the little doorway, by which he entered into the *Erechtheum*, or he passed through a gate in the gratings of the intercolumniations; he ascended then the steps on the north side of the temple and came in that way to the *eastern entrance* of the temple of *Athene Polias*. Within the temple he mentions the statue of *Athené*, which was said to have fallen from heaven, and some other curiosities. Then speaking of the olive tree, which he probably could see from the sanctuary of the goddess, he justly observes that the *Pandroseum* was (συνεχής) contiguous with the former. *The olive tree was in the Pandroseum*, which apparently occupied the whole lower part of the building. Apollod. 1, 14, 1. Besides there was in this sanctuary an altar of *Zeus Herceious*, which stood under the olive tree according to Hellanicus: Κύων εἰς τὸν τῆς Πολιάδος νεὸν εἰσελθούσα καὶ δῦσα εἰς τὸ Πανδρόσειον ἐπὶ τὸν βωμὸν ἀναβάσα τοῦ ἑρκείου Διὸς τὸν ὑπὸ τῇ ἐλαίᾳ κατέκειτο.

After having placed the three chief parts of the building in their proper sites, viz., the temple of *Athene* in the eastern, the sanctuary of *Pandrosos* in the lower part to the west, and the *Erechtheum* in the Stoa to the north; we must return to the latter in regard to some most extraordinary peculiarities.

Pausanias describes the interior of the *Erechtheum*. There was an altar of *Poseidon*, upon which they also sacrificed to *Erechtheus*; and an altar of *Hephaistos*, the father of *Erechtheus*; then an altar of *Butes* (the first priest of *Erechtheus-Poseidon*), and on the wall the painted genealogy of the *Butades*. All these things easily can be accounted for. But we have to join to them from the inscription, the altar of the *Thyechoos*, as is clearly written three times—not *θυήκοος*. ΘΥΗΧΟΟΣ means a priest who brings sacrifices, which are *fluid*, not burning or smoking. How this was we learn by the following passage of Pausanias:—"The οἶκμα being double (viz., one above and one underneath, like the οἰκήματα in the labyrinth Herod 2, 148, or like the διπλοὺν οἰκίδιον in Lysias de caede Eracth. p. 12) there is" water from the sea "in a well and in the rock are the signs of the trident, which were said to have appeared as proofs of *Poseidon's* contest about the possession of the land." These signs are indeed found at the bottom of a well cut in the rock. The well itself is still lined with stucco, and over it stood the hollow altar of the *Thyechoos*, through which the *Butade* or priest of *Erechtheus* in the dry season poured water in order to moisten the olive tree in the inner part of the *Pandroseum*. For that purpose there is still a subterraneous channel passing from the well under the wall into the soil of

the olive tree in the Pandroseum. Outside of the stoa is a cistern communicating with the well, and also by a second channel with the Pandroseum. This second channel appears now to be obstructed by masonry.

The olive tree, no doubt, was named *πάνκυφος* because it stooped under the roof of the Pandroseum and turned its branches towards the windows, which were clearly intended to admit air and dew (*δρόσος*) into the room where the olive tree was growing. There was no reason why there should not be an altar of Zeus herceios over the cistern as in other buildings. The whole Pandroseum, being destined for the olive tree, it is difficult to justify the supposition that the large and beautifully ornamented door (*τὸ θύρωμα*) in the Erechtheum should be an open entrance into the Pandroseum. If it had been, why did not Pausanias pass through it? All architectonic difficulties in regard to it vanish, when it was, as I have shown, closed and concealed from the inside of the Pandroseum by large blocks of marble, and outside ornamented with black marble slabs, which are the ones, as I presume, mentioned in the inscription.

The water in the well of the Erechtheum was called mysteriously and enigmatically *θαλάσσιον ὕδωρ*, having its origin from the sea, and afterwards was simply called *θάλασσα*,—as Strabo says, “*διὰ τὴν κρύψιν τὴν μυσικὴν τῶν ἱερῶν, ἣ σεμνοποιεῖ τὸ θεῖον*. The religion of the Greeks is full of that *κρύψις μυσικῇ*. The well chiefly being filled by rain, and the rain coming with the south wind, the priests told Pausanias that the well of the Erechtheum presented the sound of moving water at the time when the south winds blew *τὸ φρέαρ πασέχεται κυμάτων ἥχον ἐπὶ νότῳ πνεύσαντι*.

There can be no doubt that also the portico of the six virgins, the Korae of the inscription, strictly belongs to all the other sacred parts of the whole building. I think they cannot but represent the six daughters of Erechtheus, who at a time of war offered themselves for their country, and were said to have been elevated to heaven as Hyades, goddesses of the rain. The flat roof they bear upon their heads, is hollowed so as to prevent the rain from flowing off. Perhaps there was somewhere an arrangement to lead the rain into the interior of the portico and thence by a still existing doorway into the cistern of the Cekropion, or to the roots of the olive tree.

Kiel, April, 1876.

DR. FORCHHAMMER.

MY DEAR FRIEND,—

I thank you for your amiable letter and the care you have taken for getting my Paper on the Erechtheum printed in the supplements of the Institute Transactions. With regard to the idea of closing the great door, I have not seen the slabs, which filled the frames of the door, but I have seen the large regular blocks of Hymettos marble, which filled the door itself, and which were still in place (*in situ*). “The four black marble slabs, which were to be put into the frames (*ζυγά*) of the leaves of the folding doors” are mentioned in the *inscription* (Boeckh, Corp.-Inscriptionum No. 160) as: IIII. *θυραὶ λίθιναι, μηκος ὀκτὼ ποδῶν καὶ παλαστῆς, πλάτος πέντε ἡμιποδίων. τούτων τὰ μὲν ἄλλα ἐξεποίητο, ἐς τὰ ζυγὰ δὲ εἶδει τοὺς λίθους τοὺς μέλανας ἐνθεῖναι*.

Now we must not forget that Erechtheus was worshipped as a Hero; that he had his subterraneous sepulchre within the temple; and that it is proved by many examples of tombs cut in the solid rock: that the Greeks often imitated the permanently closed door of the tomb, by cutting the shape of a closed door in the rock. How then could the Athenians better symbolise the tomb of their progenitor, than by that beautiful closed door composed of black marble framed in white *ζυγά*? On the other side we know of bronze doors of temples, but nothing of stone doors, much less of black stone doors at the entrance of a temple. Besides there is no possibility of arranging the interior of the Pandroseum if

the large door could be opened. Every attempt to accommodate the interior with the door when opened, as supposed by Müller and Boeckh, has failed. I may add, that the vault of the subterraneous chamber of Cécrops (the cistern) rises *above the steps* of the door.

Believe me, my dear Donaldson, your most truly and attached Friend,

P. W. FORCHHAMMER.

KIEL, 15th July, 1876.

LETTER FROM M. LOUIS BERNIER.

CHER MONSIEUR SPIERS,—

Votre lettre et la brochure que vous avez eu l'obligeance de m'envoyer sont arrivées quelques jours seulement avant mon départ pour Rhodes. En rentrant à Athènes, je vous adresse la réponse qu'une indisposition qui a retardé mon retour, m'a empêché de vous envoyer plus tôt. Si vous avez vu M. Newton, il vous a peut-être dit que vous avons visité ensemble l'Erechthée pendant son séjour à Athènes. J'ai examiné *sur place* la restauration de M. Fergusson.

J'ai revu hier encore, toutes les parties de l'édifice et j'ai constaté la parfaite exactitude des dessins de M. Tetaz.

Quand on entreprend la restauration d'un monument, il faut d'abord se rendre compte de ce qui subsiste de ce monument, et je suis étonné que M. Fergusson, à qui on doit plusieurs ouvrages remarquables, ait mis dans ses restaurations deux portiques qui *certainement n'ont jamais existé*. En effet, ces deux portiques, **A** et **B**, auraient laissé des traces sur le mur de soubassement puisque M. Fergusson les appuie contre ce mur. Il n'existe rien, absolument rien, qui autorise cette supposition. Je vous envoie, avec cette lettre, une photographie que ne vous laissera aucune doute. Quant aux autres constructions, je n'en ai vu aucun vestige. Je n'ai donc rien trouvé à l'appui de son travail.

Je crois d'ailleurs que l'olivier sacré n'était pas place derrière le monument principal, et, à mon avis, la remarquable restauration de M. Tetaz est très vraisemblable. Vous me demandez s'il existe les traces des marches de l'escalier, **D**. Oui, elles sont visibles.

Le mur de soubassement **E** n'avait probablement pas reçu de revêtement on ne voit aucun trou de scellement. Voilà je crois, mon cher Monsieur Spiers, tous les renseignements que vous m'avez demandés. Si je dois les compléter, dites le moi. Je resterai probablement jusqu'à la fin de mois à Athènes. Recevez, etc.*

(Signed) LOUIS BERNIER.

Athènes, 3 Juin, 1876.

REMARKS ON DR. FORCHHAMMER'S COMMUNICATION.

BY MR. JAMES FERGUSSON, F.R.S., &c.

Dr. Forchhammer's Paper is one that I would not have thought it necessary to have noticed had it appeared independently in any of the ordinary channels of publication, inasmuch as it is not an answer to my article on the subject of the Erechtheum, and indeed, except a complimentary allusion to my restoration of the Mausoleum, he takes no notice of me or of my restoration, directly or indirectly, during the whole of his observations. In fact he only uses my Paper as affording him an opportunity of re-stating certain views regarding the Erechtheum, which he put forward last year in a work called

* See wood-cut at page 10.

"Daduchos." That work I had in my possession before I wrote my Paper, but the views therein enunciated, appeared to me so strangely at variance with the facts of the case as known to me, that I thought the kindest thing I could do was to say nothing about them. As, however, the Committee of Papers of the Institute think Professor Forchhammer's Paper worthy of being placed on record in the same category as mine, it becomes incumbent on me to state why I dissent from his views, though it is not pleasant to be obliged to speak disrespectfully, as I must at least appear to do, of the theories of one who has attained to such eminence among the Greek scholars of the day.

I may, I hope, however be excused from noticing the mythological views with which the Professor introduces his Paper. I said nothing about mythology, and do not profess to understand anything so transcendental as his views on the subject. My observations were confined strictly to the architecture of the building, of which I fancy I am capable of forming an opinion, and hope to be allowed to adhere to this restriction now, as that only seems to be what really concerns us on the present occasion.

The Professor commences his description of the building at the top of his third page, with what purports to be a quotation from Pausanias. How far it deserves to be considered as such, anyone can see at a glance who will either turn to the original Greek, or be content with the translation of which I printed, every word bearing on the subject (pp. 142, 143). The principal discrepancies are, that Pausanias does not use the word "west" which the Professor puts into italics; had he used any such definite indication the controversy would never have arisen. He does mention the altar of "Zeus hypatos," but does not say that it was erected by Cecrops, and he does not mention the "hypogaeon of Cecrops," as existing either where the Professor puts it, or indeed anywhere else. He is absolutely silent regarding this tomb. The assumption therefore that the "little doorway under the second pillar" led in the "Cecropion," is the Professor's own, and whether right or wrong is not justified by anything in Pausanias.

Leaving these "quotations" for the present. The route which Professor Forchhammer assumed Pausanias to have followed has at least the merit of originality. All other writers, so far as I know, understand him to have left the Parthenon by its eastern door, visited the objects at the eastern end of the Akropolis, and entered the Erechtheum by the eastern door. He, on the contrary, makes him come from the south; he either jumps down the terrace wall that extends 80 or 90 feet westward from the temple, or turns it, and then passing by the temple itself, he is made to enter what is usually assumed to be the northern portico, by the little doorway at its south-western angle. This portico thus becomes, according to Dr. Forchhammer, the Erechtheum, but in order to fit it for this purpose metal gratings are assumed to have existed between all its columns, so as to enclose it like a gigantic bird cage or wild beast's den. It need not be said that there is not a shadow of written authority for this, and I hold it to be impossible that such grilles or gratings could ever have been so fixed and sustained without mortices or traces of their fastenings being now found either on the floors or the columns; it need not be added that none such have yet been detected either by the Professor or by anyone else.*

The most startling part however of Dr. Forchhammer's theory of restoration is that the great doorway under this portico—the *θύρωμα* of the inscription, as he admits—was not a doorway at all, but a false doorway or sham, and he asserts that he himself has seen the regular blocks of blue marble with which it was originally built up. It may be so, but it is quite certain that no one else has observed these. It is true that Stuart was denied access to this part, as it was then used as a Turkish arsenal,

* A grille of some sort seems to have existed between the inner pillars of the Posticum of the Parthenon. At least the mortice holes by which such a thing could easily be sustained are perfectly distinct at the present day. See Bötticher Untersuchungen auf der Akropolis, Fig. 20 to 26.

but Lord Elgin and his artists had access to every part of the building. So had Inwood, for he drew this doorway in its minutest detail (his work was published in 1827), and so have hundreds since, yet no one either before or since has seen what Dr. Forchhammer saw, or made any remarks that could justify such an hypothesis.* We may therefore, I fancy, fairly assume that when the doorway was built up by the Turks, or whoever did it, they selected some of the larger and more regular blocks that lie scattered about the Akropolis in thousands, and did it with more care than other similar blockings up they have indulged in.

The attempt to connect the *θύρωμα* of the inscription with the *θύραι λιθιναι* is no doubt ingenious, but so far as I can judge it will not bear serious examination. The first term is used in the 78th line of the inscription, without any qualifying epithet which would lead to the assumption that it was anything but a large doorway, capable at least of opening, which is the only meaning attached to the word in any lexicon I have access to. The expression, "for ever closed," is wholly of Dr. Forchhammer's invention, and is not found in Pausanias nor anywhere else. The *θύραι λίναι* occurs in the 180th line of the inscription, but as that is perfectly consecutive, had there been any connection between them they would certainly have been mentioned together. Besides this they will not fit; according to the inscription, the slabs were $8\frac{1}{4}$ feet high. The doorway is only 15 feet in the clear, and they are 18 inches too high. They were 2 ft. 6 wide, or 5 feet together, while the doorway measures 6 feet 6 inches, so that in that direction they were 18 inches too narrow.

It would be easy to go on multiplying these verbal and technical objections to Professor Forchhammer's theory to any extent, for there is hardly a line in his description that does not appear to me to contain a misapprehension of some sort, but to my mind the great argument lies in the question, is it conceivable that the Greeks in the age of Pericles could have perpetrated such a sham. In so far as I am capable of realising the arrangement of this building there is nothing so exquisite either in Greek or in any other art as the proportion of the two pillared porticos of this building to each other, and to the relative importance of the apartments to which they led. Nothing more beautiful either in design, proportion, or utility than the great doorway to the position in which it is placed, and nothing more clever in design than the size and position of the smaller doorway relatively to the functions I conceive it was designed to fulfil. To be told now that all this is a sham which would not be tolerated at Kensal Green, is strange and rather startling, for there is really no analogy between a frontispiece of a tomb engraved on a rock and such a temple building as this. The Professor in his second letter talks of "many examples of these cut by the Greeks." I know some early barbarous ones in Asia, and equally barbarous late examples of the Roman age, but not one in Greece of the great Greek age, but here as in many other instances I must bow to his superior knowledge, and if he will produce his examples it will be time enough to discuss their relevancy. Assuming for the nonce however that these examples do exist, though I am ignorant of the fact, the absurdity in so far as I can judge, lies in the assumption that the Greeks set up a sham doorway in front of what every one in Athens—if the Professor is right—knew to be the tomb of Cecrops, in order that it might simulate the tomb of Erechtheus. In his second letter he admits, in contradiction to the theory of his first, that the sepulchre of Erechtheus was within the Temple, and there I believe he is right, and I have pointed out what I believe to be indubitably the remains of that tomb, but he prefers to contradict himself rather than notice anything I may have pointed out.

* In his second letter to Professor Donaldson he somewhat modifies the expression used in his first statement, but he adheres to the assertion that the masonry he saw was the original filling up of the doorway and erected when the temple was first built; which is all we are at present concerned with.

There are other difficulties in the Professor's theory as great as these, which it would be easy though tedious to dwell upon. Meanwhile I am prepared to take my stand on the broad ground that such contrivances and such shams as he insists upon are in direct opposition, not only to every principle of Greek, but of any, true art, in any part of the world. If he is right, not only I, but every one who has hitherto written on Greek art, is hopelessly wrong; we must all go to school again to learn the first elements of the art.

The truth of the matter appears to be, that Professor Forchhammer has been led away by a discovery he fancied he made on the spot, and to which all his ideas of the building have been made to bow. Just inside the western wall of the Temple is a long, low vault, extending the whole width across. It is about 12 feet wide, and 6 feet 6 inches high in the centre of the arch, which is constructed of rubble masonry, the stones composing it being not much larger than ordinary bricks. In some parts the arch is single, the stones being a foot or so long. In others it is in two rims, but nowhere is it more than 18 inches in thickness; the stones of which it is composed being only very partially dressed. It is divided into three compartments by two strengthening arches, and no access is obtained to it except by a man-hole in the roof of the centre compartment.

Professor Forchhammer admits, in his present Paper that Thiersch, Raoul Rochette, the members of the Athenian Commission—he might have added Tetaz, Beulé, and in fact every one else who has mentioned it—assume it to be a modern Turkish construction. Nine people, in fact, out of ten, who have written on the subject do not mention it at all, it appears to them so manifestly modern; and all those who do mention it, except Forchhammer, distinctly state that it is a Turkish cistern, or granary, or storehouse of some sort. In his "Daduchos" (p. 131), Professor Forchhammer instances the Cloaca Maxima at Rome, as a vault similar to this, but that is composed of three rims of cleanly dressed and perfectly fitted stones, aggregating 5 feet in thickness, and consequently infinitely superior to a rubbishy rubble vault like this, only a foot to 18 inches in thickness; and consequently, till something more analogous is brought forward, I for one decline to believe that this vault was an integral part of one of the most highly finished temples of the best age of Greek art. Besides this, as the Professor admits, its extrados rises a foot or more above the floor line of the temple, as marked by the steps of the north and west doorways, and by the narrow course marking the floor line all round the interior. When covered by the pavement, which I presume it will be admitted it once was, this discrepancy of the levels would have been even more marked, and so far as I can judge, in Greek art impossible.

If what has been said above is sufficient to justify me in rejecting Professor Forchhammer's views on the two cardinal points—of the sham doorway, symbolising the tomb of Erechtheus; and the Turkish vault, being the tomb of Cecrops—it is no use attempting to follow the argument further. If he is right in these, all the assumptions interspersed throughout his essay may be right; but if he is wrong on these two points, his whole theory falls to the ground like a house of cards, and it is no use arguing about what, in that latter case, becomes manifestly untenable.

It may, for instance, be left to botanists to decide whether the olive tree would grow in a chamber with a solid roof, lighted only by three small windows looking to the west. I fancy it would not; but, at all events, I feel sure that his plan of moistening its roots with salt water would not improve its vigour or health. In like manner it is needless to inquire whether the bitch, who figures so largely in all restorations of the temple, was likely to leap down a clear drop of 10 feet, which is the only means of communication the Professor provides between the upper and lower temples. I feel sure, at all events, that neither the priests or votaries were likely to follow her example; and if they did, it is difficult to see how they would ever get back again. But these are details which are hardly worth alluding to, and only to be understood by examining the plates in his "Daduchos."

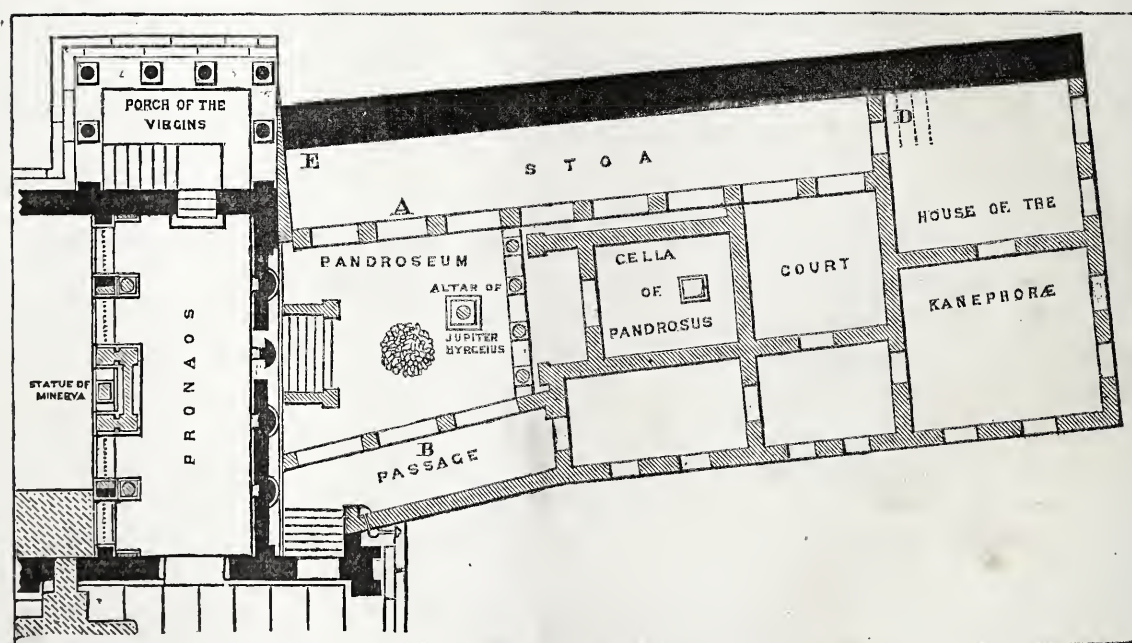
As Professor Forchhammer nowhere in his paper alludes to my restoration, nor to the arguments by which I sought to sustain it, no defence or re-statement of them is called for, or necessary, at present. My views remain exactly where they were before the Professor's Paper was written, with this only difference: The Institute have now before them two separate and independent restorations of the Temples of the Erechtheum, and can choose whichever most accords with their interpretation of the authorities, or their views of the principles of Greek art. For myself, I have, I believe, said enough above to justify me in declining to accept the Professor's views as a substitute, or even an improvement in any way on my own; and this seems to be all that is at present required.

In conclusion, I can only say, it is now more than thirty years since I first became personally acquainted with the buildings in the Akropolis, at Athens, and during the interval they have seldom been long out of mind; and I have thought much and written a good deal about Greek architectural art. The result has been, that I have arrived at views so diametrically opposed to those of Professor Forchhammer, not only as to the first principles of Greek art, but also as to the mode in which authorities should be interpreted and restoration attempted, that agreement between us seems impossible. I may, of course, be mistaken, and my views be as completely beneath attention as Professor Forchhammer considers them to be; but I decline to admit that this is the case, till at least, something more pertinent to the subject is brought forward than anything contained in the Paper now under examination.

POSTSCRIPT.—Since the above was written, a copy of M. Louis Bernier's letter to Mr. Phené Spiers has been communicated to me. It does not in the least shake my confidence in the correctness of my views, though he is so absolutely certain that the two porticos which I showed on the north and south sides of the Pandroseum, never could have existed. In the first place, whether their foundations exist or not can only be ascertained by digging; and he has not dug. I do not, however, feel any confidence that they will be found even then. The place was at one time used as a Christian burying-ground, and afterwards covered by houses; and those who cleared away these houses, "down to the rock"—it is said—most probably cleared away all foundations, ancient and modern. The buildings I assume to have stood there, were so insignificant in size, that their foundations would hardly strike anyone as important, unless he was looking for something he expected from other indications to find. Meanwhile, however, I have perfect faith in Bötticher's elaborate survey of the north-west corner, a woodcut of a portion of which I gave (page 147), and both on the ground and on the wall of the temple he shows that a portico or passage did exist there; and what he asserts is confirmed both by the Greek Commission (Πρακτικά Κ. Τ. λ.) and by photographs. It consequently requires something more than a mere assertion by M. Bernier to shake my faith in it.

With regard to the southern portico, there is a sinking in the west wall of the Temple, which Inwood saw and measured with great care; and so convinced was he that some building joined the temple there, that he added the staircase that is shown in his restoration. There was no authority or need for this staircase; but he felt certain something was joined on there, and he could think of nothing better. The Greek Commission of Archæologists confirm Inwood's drawings in the minutest details, and I have before me photographs which I produced at the Institute on the occasion of my reading my Paper, which make all this so clear that I have no doubt they do exist, in spite of M. Bernier's assertion to the contrary. It may or may not have been a portico, but it was something that no one yet has accounted for in a manner that conforms with either the authorities or with the exigencies of the case. Except on the assumption that it was the Stoa mentioned in the inscription, I do not know what it was, but that, I maintain, does explain all the appearances in so far as they have yet been brought to light, and all the authorities so far as they are known. .

The truth of the matter appears to be, M. Bernier visited the Akropolis, with a strongly pre-conceived bias against my views, and saw, not so much what was there, as what he wished to see. He evidently has not read my Paper with attention—probably cannot—and not having his attention specially drawn to the points, overlooked them and denied their existence. Nor does this surprise me in a man who, after the absurdity of the thing is pointed out to him, allows his patriotism to so far warp his judgment, as to believe that the Greeks inserted three windows into the western wall of this temple, in order to light a court yard open to the sky, as is the case in Tetaz's restoration. Poor Greeks! If Forchhammer and Bernier are to be believed, they certainly showed less common sense in their designs than any people whose works have yet come to our knowledge.

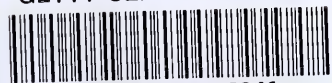


PLAN OF PANDROSEUM

With References A, B, D and E in M. Bernier's Letter.



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